UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
475 ALLENDALE ROAD
KING OF PRUSSIA, PENNSYLVANIA 19406-1415

August 17, 2004

Docket No. 03001317 License No. 08-01738-02
Control No. 135458

Colonel Thomas M. Fitzpatrick, M.C.
Deputy Commander for Clinical Services
Department of the Army
Walter Reed Army Medical Center
6900 Georgia Avenue, N.W.
Washington, D.C. 20307-5001

SUBJECT: DEPARTMENT OF THE ARMY, ISSUANCE OF LICENSE AMENDMENT, CONTROL NO. 135458

Dear Colonel Fitzpatrick:

This refers to your letter received May 24, 2004, requesting renewal of License No. 08-01738-02 and consolidation of the authorizations contained on License No. 08-01738-03 into License No. 08-01738-02. As I discussed with your Radiation Safety Officer, LTC John Mercier, on August 10, 2004, in order to process your request for consolidation of the licenses in a timely manner, we elected to separate the request for consolidation from the request for renewal. Enclosed with this letter is the consolidated license. Under separate cover you will receive a copy of License No. 08-01738-03, which was terminated. Your license renewal has not yet been completed.

If there are any errors or questions, please notify the U.S. Nuclear Regulatory Commission, Region I Office, Licensing Assistance Team, (610) 337-5239, so that we can provide appropriate corrections and answers.

An environmental assessment for this action is not required, since this action is categorically excluded under 10 CFR 51.22(c)(14).

In accordance with 10 CFR 2.390, a copy of this letter will be placed in the NRC Public Document Room and will be accessible from the NRC Web site at http://www.nrc.gov/reading-rm.html.

Thank you for your cooperation.

Sincerely,

Original signed by James P. Dwyer

James P. Dwyer
Senior Health Physicist
Nuclear Materials Safety Branch 1
Division of Nuclear Materials Safety

Information in this record was deleted
in accordance with the Freedom of Information
Act, exemptions 2
FOIA- 2006-0238

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Enclosure:
Amendment No. 77

cc:
LTC John R. Mercier, Ph.D., Radiation Safety Officer

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MATERIALS LICENSE

Pursuant to the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974 (Public Law 93-438), and Title 10, Code of Federal Regulations, Chapter I, Parts 30, 31, 32, 33, 34, 35, 36, 39, 40, and 70, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, possess, and transfer byproduct, source, and special nuclear material designated below; to use such material for the purpose(s) and at the place(s) designated below; to deliver or transfer such material to persons authorized to receive it in accordance with the regulations of the applicable Part(s). This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954, as amended, and is subject to all applicable rules, regulations, and orders of the Nuclear Regulatory Commission now or hereafter in effect and to any conditions specified below.

Licensee	In accordance with the letter received May 24, 2004
1. Department of the Army Walter Reed Army Medical Center (WRAMC)	3. License number 08-01738-02 is amended in its entirety to read as follows:
2. Washington, D.C. 20307-5001	4. Expiration date June 30, 2004 (extended)
	5. Docket No. 030-01317 Reference No. 08-01738-03

6. Byproduct, source, and/or special nuclear material	7. Chemical and/or physical form	8. Maximum amount that licensee may possess at any one time under this license
A. Any byproduct material with atomic numbers 1-83	A. Any	A. 400 millicuries of each radionuclide with a total possession limit of 26 curies
B. Iodine 131	B. Any	B. 2 curies
C. Xenon 133	C. Any	C. 2 curies
D. Krypton 85	D. Any	D. 1 curie
E. Phosphorus 32	E. Any	E. 2 curies
F. Carbon 14	F. Any	F. 2 curies
G. Iodine 125	G. Any	G. 1 curie
H. Iridium 192	H. Any	H. [redacted] Ex 2
I. Chromium 51	I. Any	I. 750 millicuries
J. Sulfur 35	J. Any	J. 1 curie
K. Hydrogen 3	K. Any	K. 5 curies
L. Molybdenum 99	L. Molybdenum 99/ Technetium 99m Generators	L. 23 curies

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6. Byproduct, source, and/or special nuclear material	7. Chemical and/or physical form	8. Maximum amount that licensee may possess at any one time under this license
M. Technetium 99m	M. Any	M. 23 curies
N. Strontium 90	N. Sealed sources	N. [redacted]
O. Cesium 137	O. Sealed sources	O. [redacted]
P. Gadolinium 153	P. Sealed sources	P. [redacted]
Q. Iodine 125	Q. Sealed sources (3M Company seeds)	Q. 1 curie
R. Iodine 125	R. Sealed sources (Norland Inst. Co., Model 178A591A or AECL Models C235 or C324, or Amersham Corp. Model IMC.P2)	R. 4 sources, not to exceed 300 millicuries each
S. Cesium 137	S. Sealed sources	S. [redacted]
T. Cobalt 60	T. Sealed sources	T. [redacted]
U. Americium 241	U. Any	U. 100 microcuries
V. Americium 241	V. Sealed sources	V. [redacted]
W. Nickel 63	W. Sealed sources and foils	W. 1 curie
X. Iodine 129	X. Sealed sources	X. 1 curie
Y. Thorium	Y. Any	Y. 5 kilograms
Z. Uranium	Z. Any	Z. 50 kilograms
AA. Cesium 137	AA. Sealed sources	AA. [redacted]
BB. Americium 241	BB. Sealed sources	BB. [redacted]

UNITED STATES NUCLEAR REGULATORY COMMISSION

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6. Byproduct, source, and/or special nuclear material	7. Chemical and/or physical form	8. Maximum amount that licensee may possess at any one time under this license
CC. Palladium 103	CC. Sealed sources	CC. 3 curies
DD. Iridium 192	DD. Sealed sources	DD. [illegible]
EE. Uranium depleted in Uranium 235	EE. Plated Metal	EE. 400 Kilograms
FF. Cobalt 60	FF. Sealed Sources	FF. No single source to exceed the maximum activity per source or maximum activity per device specified in the certificate of registration issued by the U.S. Nuclear Regulatory Commission or an Agreement State
GG. Cesium 137	GG. Sealed Sources	GG. No single source to exceed the maximum activity per source or maximum activity per device specified in the certificate of registration issued by the U.S. Nuclear Regulatory Commission or an Agreement State

9. Authorized use:

A. through DD.	Medical diagnosis, therapy and research in humans in accordance with any applicable Food and Drug Administration (FDA) requirements. Research and development as defined in 10 CFR 30.4, including animal studies; instrument calibration; student instruction.
EE.	Shielding in linear accelerators.
FF. and GG.	For irradiation of materials in self-shielded irradiator devices that have been registered either with the U.S. Nuclear Regulatory Commission under 10 CFR 32.210 or with an Agreement State and which have been distributed in accordance with a Commission or Agreement State specific license authorizing distribution to persons specifically authorized by a Commission or Agreement State license to receive, possess, and use the devices.

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CONDITIONS

10. A. Licensed material in Items 6.A through 6.EE may be used only at the licensee's facilities located at the Walter Reed Army Medical Center, Washington, D. C.; WRAMC Forest Glen Section and Annex, Silver Spring, Maryland; U.S. Army Medical Laboratory, WRAMC Department of Pathology, Fort Meade, Maryland; Rickman Building, 13 Taft Court, Rockville, Maryland and Gillette Building, 270 Research Center, 1413 Research Boulevard, Rockville, Maryland.

B. Licensed material in Items 6.FF and 6.GG may be used or stored only at the licensee's facilities located at Walter Reed Army Medical Center, Washington, D.C. and Walter Reed Army Institute for Research, Forest Glen Annex, Silver Spring, Maryland.

11. A. Licensed material in Items 6.A through 6.EE shall be used by, or under the supervision of, individuals designated in writing by the Radiation Safety Committee, Colonel Thomas M. Fitzpatrick, Chairperson.

B. Licensed material in Items 6.FF and 6.GG shall be used by, or under the supervision of, individuals who have received the training described in the application dated October 15, 2001 and have been designated, in writing, by the Radiation Safety Officer.

C. The use of licensed material in or on humans shall be by a physician, dentist, or podiatrist as defined in 10 CFR 35.2.

D. Physicians, dentists, or podiatrists designated to use licensed material in or on humans shall meet the training criteria established in 10 CFR 35, Subpart J and shall be designated in writing by the licensee's Radiation Safety Committee.

E. Individuals designated to work as medical physicists for intravascular brachytherapy shall meet the training and experience criteria established in 10 CFR 35.961; or be named on a current U.S. Nuclear Regulatory Commission or Agreement State license, or a permit issued under a broad scope license as a medical physicist; and shall be designated, in writing, by the Radiation Safety Committee. In addition, the physicist must meet the recentness of training requirement in 10 CFR 35.972 and have recent, device-specific training and experience for each make and model of intravascular brachytherapy device used by the licensee.

F. The Radiation Safety Officer for this license is Lieutenant Colonel John R. Mercier.

12. In addition to the possession limits in Item 8, the licensee shall further restrict the possession of licensed material at a single location to quantities below the limits specified in 10 CFR 30.72 which require consideration of the need for an emergency plan for responding to a release of licensed material.

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13. The licensee is exempted from decommissioning financial assurance requirements for possession of

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licensed material in sealed sources in quantities greater than the limits in 10 CFR 30.35(d) for the purposes of source changes only. This exemption is granted for no more than 30 days for any one source change.

14. Notwithstanding the requirements of 10 CFR 35.49(a) and (b), 35.100, 35.200, 35.300, 35.400 and 35.500 the licensee may use for any medical use any byproduct material or reagent kit. The licensee shall possess and use byproduct material for medical use in accordance with the prescriptive and performance criteria in the other sections of 10 CFR 35. This does not relieve the licensee from complying with applicable U.S. Food and Drug Administration (FDA) and other Federal and State requirements.

15. A. Detector cells containing a titanium tritide foil or a scandium tritide foil shall only be used in conjunction with a properly operating temperature control mechanism which prevents the foil temperatures from exceeding that specified in the certificate of registration referred to in 10 CFR 32.210.

    B. When in use, detector cells containing a titanium tritide foil or a scandium tritide foil shall be vented to the outside.

16. The licensee shall conduct a physical inventory every three months to account for all sealed sources and devices containing licensed material received and possessed pursuant to 10 CFR 35.59, 35.400 and 35.500 and every six months for all other sealed sources and devices.

17. A. Sealed sources and detector cells containing licensed material shall be tested for leakage and/or contamination at intervals not to exceed six months or at such other intervals as are specified by the certificate of registration referred to in 10 CFR 32.210, not to exceed three years.

    B. Notwithstanding Paragraph A of this Condition, sealed sources designed to emit alpha particles shall be tested for leakage and/or contamination at intervals not to exceed three months.

    C. In the absence of a certificate from a transferor indicating that a leak test has been made within six months prior to the transfer, a sealed source or detector cell received from another person shall not be put into use until tested.

    D. Each sealed source fabricated by the licensee shall be inspected and tested for construction defects, leakage, and contamination prior to any use or transfer as a sealed source.

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E. Sealed sources and detector cells need not be leak tested if:

(i) they contain only hydrogen-3; or

(ii) they contain only a radioactive gas; or

(iii) the half-life of the isotope is 30 days or less; or

(iv) they contain not more than 100 microcuries of beta and/or gamma emitting material or not more than 10 microcuries of alpha emitting material; or

(v) they are not designed to emit alpha particles, are in storage, and are not being used. However, when they are removed from storage for use or transfer to another person, and have not been tested within the required leak test interval, they shall be tested before use or transfer. No sealed source or detector cell shall be stored for a period of more than 10 years without being tested for leakage and/or contamination.

F. The test shall be capable of detecting the presence of 0.005 microcurie of radioactive material on the test sample. If the test reveals the presence of 0.005 microcurie or more of removable contamination, a report shall be filed with the U.S. Nuclear Regulatory Commission and the source or detector cell shall be removed immediately from service and decontaminated, repaired, or disposed of in accordance with Commission regulations. The report shall be filed within five days of the date the leak test result is known with the U.S. Nuclear Regulatory Commission, Region I, ATTN: Chief, Nuclear Materials Safety Branch, 475 Allendale Road, King of Prussia, Pennsylvania 19406. The report shall specify the source or detector cell involved, the test results, and corrective action taken.

G. The licensee is authorized to collect leak test samples for analysis by the licensee. Alternatively, tests for leakage and/or contamination may be performed by persons specifically licensed by the Commission or an Agreement State to perform such services.

18. Sealed sources or detector cells containing licensed material shall not be opened or sources removed from source holders by the licensee.

19. The licensee shall not repair, remove, replace or alter any of the following: electrical and mechanical systems that control irradiator source or shielding movement, the irradiator's shielding or sealed source, safety interlocks, or any component that may affect safe operation of the irradiator. These activities shall be performed by a person specifically licensed by the U.S. Nuclear Regulatory Commission or an Agreement State to perform such services.

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20. For each irradiator installed and used, the licensee shall:

A. Permit the use of the irradiator only when a calibrated and operable radiation survey meter or room monitor is available; and

B. Permit the irradiator door to be opened only after the operator has checked visual indicators to verify that the source has returned to its safe storage position; and

C. Have room monitors installed that will:

(i) Operate at all times when the irradiator is in use; and
(ii) Activate a visible and audible alarm when radiation exceeds 2 millirems per hour; and
(iii) Detect any radiation leaking from the irradiator door; and
(iv) Be visible to the irradiator user when the user is next to the irradiator; or

D. If a room monitor is not installed, have available a calibrated and operable survey meter which will be used to:

(i) Determine the radiation level at the irradiator door when the door is closed; and
(ii) Check for any increase in radiation levels each time the irradiator door is opened.

E. If abnormal radiation levels or any malfunctions of the irradiator are detected at any time, the licensee shall cease using the irradiator, restrict access to the area housing the irradiator, immediately notify the Radiation Safety Officer, and submit all reports required under 10 CFR Parts 20, 21 or 30.

F. Not repair or authorize repairs of the irradiator except by the manufacturer or other persons specifically authorized by the U.S. Nuclear Regulatory Commission or an Agreement State to perform such services.

21. The licensee is authorized to hold radioactive material with a physical half-life of less than 65 days and Sulfur 35, Cobalt 58, Iridium 192, Scandium 46, for decay-in-storage before disposal in ordinary trash, provided:

A. Waste to be disposed of in this manner shall be held for decay a minimum of ten half-lives.

B. Before disposal as ordinary trash, the waste shall be surveyed at the container surface with the appropriate survey instrument set on its most sensitive scale and with no interposed shielding to determine that its radioactivity cannot be distinguished from background. All radiation labels shall be removed or obliterated.

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C. A record of each such disposal permitted under this License Condition shall be retained for three years. The record must include the date of disposal, the date on which the byproduct material was placed in storage, the radionuclides disposed, the survey instrument used, the background dose rate, the dose rate measured at the surface of each waste container, and the name of the individual who performed the disposal.

22. The licensee shall possess and use byproduct material for human research in accordance with the prescriptive and performance criteria in all sections of 10 CFR Part 35 except sections 35.49(a) and (b), 35.100, 35.200, and 35.300.

23. Experimental animals, or the products from experimental animals, that have been administered licensed materials shall not be used for human consumption.

24. The licensee is authorized to transport licensed material in accordance with the provisions of 10 CFR Part 71, "Packaging and Transportation of Radioactive Material."

25. The licensee shall not acquire licensed material in a sealed source or device unless the source or device has been registered with the U.S. Nuclear Regulatory Commission pursuant to 10 CFR 32.210 or equivalent regulations of an Agreement State.

26. Radioactive waste generated shall be stored in accordance with the statements, representations, and procedures included with the waste storage plan described in the licensee's letter/application dated September 9, 1993 and October 29, 1993.

27. Notwithstanding the requirements of 10 CFR 35.315(a)(7), the licensee may control contamination in rooms used to house radiopharmaceutical therapy patients in accordance with the commitments and procedures contained in the letters dated April 8, 1992 and November 24, 1992.

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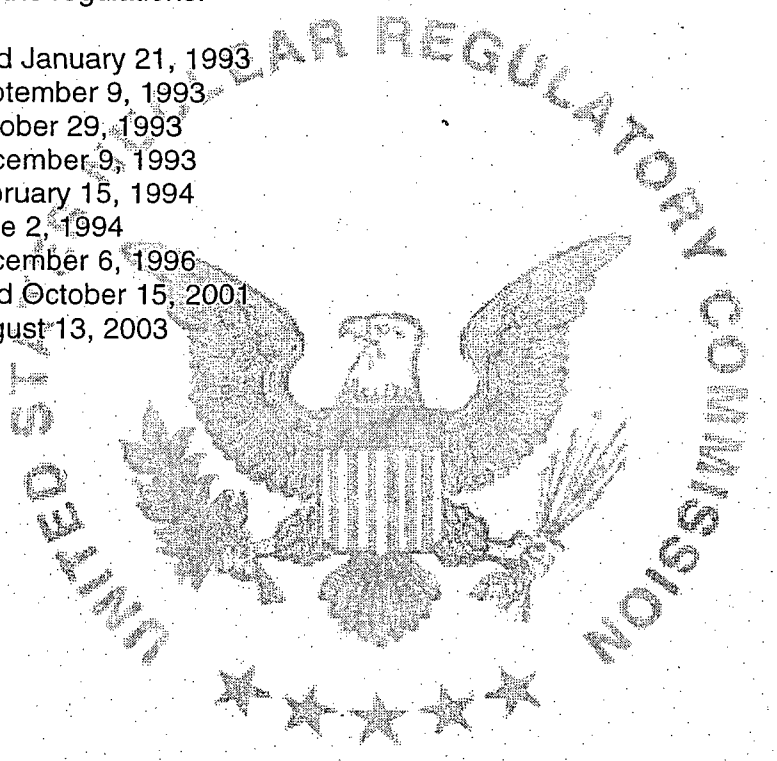
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28. Except as specifically provided otherwise in this license, the licensee shall conduct its program in accordance with the statements, representations, and procedures contained in the documents, including any enclosures, listed below, except for minor changes in the medical use radiation safety procedures as provided in 10 CFR 35.31. The U.S. Nuclear Regulatory Commission's regulations shall govern unless the statements, representations, and procedures in the licensee's application and correspondence are more restrictive than the regulations.

A. Application dated January 21, 1993
B. Letter dated September 9, 1993
C. Letter dated October 29, 1993
D. Letter dated December 9, 1993
E. Letter dated February 15, 1994
F. Letter dated June 2, 1994
G. Letter dated December 6, 1996
H. Application dated October 15, 2001
I. Letter dated August 13, 2003



For the U.S. Nuclear Regulatory Commission

Date August 17, 2004

By ***Original signed by James P. Dwyer***

James P. Dwyer
Nuclear Materials Safety Branch 1
Division of Nuclear Materials Safety
Region I
King of Prussia, Pennsylvania 19406

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
475 ALLENDALE ROAD
KING OF PRUSSIA, PENNSYLVANIA 19406-1415

September 29, 2004

Docket No. 03001317 License No. 08-01738-02
Control No. 135047

Colonel Thomas M. Fitzpatrick, M.C.
Deputy Commander for Clinical Services
Department of the Army
Walter Reed Army Medical Center
6900 Georgia Avenue, NW
Washington, DC 20307-5001

SUBJECT: DEPARTMENT OF THE ARMY, REQUEST FOR ADDITIONAL INFORMATION CONCERNING APPLICATION FOR RENEWAL OF LICENSE, CONTROL NO. 135047

Dear Colonel Fitzpatrick:

This is in reference to your application dated May 21, 2004 requesting to renew Nuclear Regulatory Commission License No. 08-01738-02. In order to continue our review, we need the following additional information:

1. Items #5 and #6 of your application list several sealed sources without the identity of the source manufacturer and model number. Please identify the manufacturer and model number of the following sealed sources:

Subitem #	Radioisotope	Maximum Activity
O	strontium 90	500 millicuries
P	cesium 137	
Q	gadolinium 153	
R	iodine 125	500 millicuries
S	cesium 137	

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2. Your current license, Amendment No. 77, authorizes the possession and use of the following sealed sources/foils that were not identified in Items #5 and #6 of your renewal application:

Authorization	Listing in Amendment No. 77
Iodine 125 sealed sources	Item 6.R.
Cobalt 60 sealed sources	Item 6.T.
Nickel 63 sealed sources and foils	Item 6.W.
Iodine 129 sealed sources	Item 6.X.
Americium 241 sealed sources	Item 6.BB.
Iridium 192 sealed sources	Item 6.DD.

For each one of these sealed sources/foils, please identify which of the following applies:

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(a) You wish to continue to be authorized to possess and use these sealed sources/foils;

(b) You wish to continue to be authorized to possess and use these sealed sources/foils but the quantity you possess is small enough to allow possession under your current broad scope authorization (any byproduct material with atomic number 3-83 in any form with a possession limit of 400 millicuries of each radionuclide with a total possession limit of 26 curies) or under the proposed expansion of this broad scope authorization (any byproduct material with atomic number 84 to 96 in any form with a possession limit of 100 millicuries of each radionuclide with a total possession limit of 1 curie);

(c) These sealed sources/foils have never been possessed; or

(d) These sealed sources/foils have been possessed previously but are not now in use. For each sealed source/foil to which this statement applies, confirm they have been transferred or disposed of so the sealed sources/foils can be removed from your license.

In addition, for each sealed source/foil to which (a) applies, please identify the sealed source/foil manufacturer and model number.

3. Items #5 and #6 of your application, subitem B, requests authorization to possess any byproduct material with atomic number 84-96, in any form, 100 millicuries of each radionuclide, with a total possession limit of 1 curie. This request will result in a significant addition to your current license authorization. In consideration of this request, please review your Decommissioning Funding Plan and advise us as to whether additional funding will be required.

4. Your current license authorizes possession of 400 kilograms of plated uranium metal depleted in uranium 235, to be used for shielding in linear accelerators, and Items #5 and #6 of your application, subitem W, request a similar authorization. Please list the linear accelerators currently in your possession that contain depleted uranium shielding. In addition, list any linear accelerators formerly in your possession that contained depleted uranium shielding, and provide the records of transfer or disposal.

5. Item #7 of your application, paragraph #2, indicates for human use, licensed material shall be used by or under the supervision of individuals designated by the Walter Reed Army Medical Center (WRAMC) Radiation Safety Committee (RSC) and that the RSC, with Radiation Safety Officer (RSO) approval, may grant case-by-case exceptions. Please describe the criteria the RSC will use to grant these exceptions.

6. Item #7 of your application, paragraph #3, indicates for non-human use, Principal Investigators and Co-Investigators who meet the training and experience criteria expressed in NUREG 1556, Volume 7, Section 8.7.2, may be designated as authorized users by the RSO. Item #7, paragraph #4, states that for self-shielded irradiators, personnel who meet the training and experience criteria expressed in NUREG 1556,

Volume 5, Appendix G, will be designated as authorized users by the RSO. As described in 10 CFR 33.11, WRAMC has a Type A specific license of broad scope. 10 CFR 33.13(c)(3)(iii) requires, in part, that the applicant for a Type A specific license of broad scope establish administrative controls and provisions relating to organization and management that are necessary to assure safe operations, including the establishment of appropriate administrative procedures to assure review and approval by the radiation safety committee of safety evaluations of proposed uses prior to use of the byproduct material. While in practice the RSO may approve of some byproduct material users on an interim basis (such as between RSC meetings), final approval of users in a Type A specific program of broad scope is reserved for the RSC. Please confirm that final approval of all users will be by the RSC.

In addition, Item #7 of your application, paragraphs #3 and #4 indicate the RSC, with RSO approval, may grant case-by-case exceptions. Please describe the criteria the RSC will use to grant these exceptions.

7. Please describe the process and specific criteria used by your RSC to review and approve of proposed medical and non-medical uses of byproduct material.

8. Provide the criteria that will be used by the RSC to approve uses, training for authorized personnel, and facilities for emerging technologies licensed under 10 CFR 35.1000. The "Licensing Guidance for 10 CFR 35.1000 Sealed Sources and Devices" on the NRC public website at http://www.nrc.gov/materials/miau/med-use-toolkit.html may be useful in developing your criteria.

9. Provide a copy of senior management's written statement of delegation of authority to the RSO. This statement should include the requisite authority to communicate with and direct your personnel regarding NRC regulations and license provisions and to enforce these requirements including the ability to terminate any unsafe operation involving the use of licensed material. Appendix J of NUREG-1556, Volume 11 contains a model delegation of authority and may be helpful to you in developing your response.

10. Provide a statement delineating the RSO duties and responsibilities for carrying out the radiation safety program. Section 8.7.3 of NUREG-1556, Volume 11 discusses the duties and responsibilities of the RSO and may be helpful in developing your response.

11. Submit a specific and detailed description of the duties and responsibilities of the RSC and the administrative procedures by which these functions are carried out. Section 8.7.2, "Radiation Safety Committee" of NUREG-1556, Volume 11 contains information on the duties and responsibilities of the Radiation Safety Committee and may be helpful to you in developing your response.

12. Item #10 of your application, paragraph #1, discusses what appears to be the annual audit required by 10 CFR 20.1101(c). Please describe the audit mechanism implemented by the RSO on a more routine basis to determine user compliance with NRC regulations, the terms and conditions of the NRC license, the requirements of the RSC approved permits and good health physics practices.

13. Please describe your administrative procedures to assure control of procurement and use of byproduct material.

14. NRC will provide even greater flexibility to Type A Broad Scope licensees to make program changes and changes to procedures specifically identified in documents which were previously approved by the Commission and incorporated into the license, without prior Commission approval. If you would like authorization for this flexibility, please provide the following statements.

    a. Changes to your program and procedures will be limited to the following areas: training; audit program; radiation monitoring instruments; material receipt and accountability; safe use of radionuclides and emergency procedures; and radiation surveys. In addition, state that you will apply for, and receive an amendment to your license prior to implementing any other programmatic or procedural changes.

    b. The proposed revision will be documented, reviewed, and approved by the your Radiation Safety Committee in accordance with established procedures prior to implementation.

    c. The revised program will be in accordance with regulatory requirements, will not change the license conditions, and will not decrease the effectiveness of the Radiation Safety Program.

    d. Your staff will be trained in the revised procedures prior to implementation.

    e. Your audit program will evaluate the effectiveness of the change and its implementation.

In accordance with 10 CFR 2.390, a copy of this letter will be placed in the NRC Public Document Room and will be accessible from the NRC Web site at http://www.nrc.gov/reading-rm.html.

We will continue our review upon receipt of this information. Please reply to my attention at the Region I Office and refer to Mail Control No. 135047. If you have any technical questions regarding this deficiency letter, please call Sandy Gabriel at (610) 337-5182 or contact her by e-mail at slg2@nrc.gov.

In order to continue prompt review of your application, we request that you submit your response to this letter within 30 calendar days from the date of this letter. You may fax your response to (610) 337-5269.

Sincerely,

Original signed by James P. Dwyer

James P. Dwyer
Senior Health Physicist
Nuclear Materials Safety Branch 1
Division of Nuclear Materials Safety

Enclosures:
1. 10 CFR Parts 19, 20, 30 and 35
2. NUREG-1556, Vol. 11

cc:
LTC John R. Mercier, Ph.D., Radiation Safety Officer

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DEPARTMENT OF THE ARMY
WALTER REED ARMY MEDICAL CENTER
6900 GEORGIA AVE NW
WASHINGTON DC 20307-5001

10 January 2005

REPLY TO
ATTENTION OF:
Office of the Deputy Commander
for Clinical Services

MSI6
K-8

U.S. Nuclear Regulatory Commission
Region I
ATTN: Nuclear Materials Safety Branch (Ms. Sandy Gabriel)
475 Allendale Road
King of Prussia, PA 19406-1415

Dear Ms. Gabriel:

In response to your letter, NRC Docket No. 03001317, Control No. 135047, dated 29 September 2004, we hereby submit a completely revised broad scope license 10-year renewal application (NRC Form 313 with attachments). We are currently operating under Amendment No. 77 to license No. 08-01738-02, which has been extended under timely renewal procedures.

Your point of contact for this Command is Lieutenant Colonel John Mercier, Ph.D., (202) 356-0058.

Sincerely,

Thomas M. Fitzpatrick
Colonel, Medical Corps
Deputy Commander for Clinical Services

Enclosure

Copy Furnished:
Headquarters, US Army Medical Command, ATTN: POPM-SA, Fort Sam Houston, TX 78234.

Information in this record was deleted
in accordance with the Freedom of Information
Act, exemptions 2+6
FOIA- 2006-0238

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135047

NMSS/RGN1 MATERIALS-002

ML050140255

NRC FORM 313 (4-2004)
10 CFR 30, 32, 33, 34, 35, 36, 39, and 40

U.S. NUCLEAR REGULATORY COMMISSION

APPLICATION FOR MATERIAL LICENSE

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

Estimated burden per response to comply with this mandatory collection request: 7 hours. Submittal of the application is necessary to determine that the applicant is qualified and that adequate procedures exist to protect the public health and safety. Send comments regarding burden estimate to the Records and FOIA/Privacy Services Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects@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, the 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:

ALABAMA, CONNECTICUT, DELAWARE, DISTRICT OF COLUMBIA, FLORIDA, GEORGIA, KENTUCKY, MAINE, MARYLAND, MASSACHUSETTS, MISSISSIPPI, NEW HAMPSHIRE, NEW JERSEY, NEW YORK, NORTH CAROLINA, PENNSYLVANIA, PUERTO RICO, RHODE ISLAND, SOUTH CAROLINA, TENNESSEE, VERMONT, VIRGINIA, VIRGIN ISLANDS, OR WEST VIRGINIA, SEND APPLICATIONS TO:

LICENSING ASSISTANCE TEAM
DIVISION OF NUCLEAR MATERIALS SAFETY
U.S. NUCLEAR REGULATORY COMMISSION, REGION I
475 ALLENDALE ROAD
KING OF PRUSSIA, PA 19406-1415

IF YOU ARE LOCATED IN:

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

MATERIALS LICENSING BRANCH
U.S. NUCLEAR REGULATORY COMMISSION, REGION III
2443 WARRENVILLE ROAD, SUITE 210
LISLE, IL 60532-4352

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 BRANCH
U.S. NUCLEAR REGULATORY COMMISSION, REGION IV
611 RYAN PLAZA DRIVE, SUITE 400
ARLINGTON, TX 76011-4005

030 01317

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

1. THIS IS AN APPLICATION FOR *(Check appropriate item)*
   - [ ] A. NEW LICENSE
   - [ ] B. AMENDMENT TO LICENSE NUMBER
   - [x] C. RENEWAL OF LICENSE NUMBER 08-01738-02

2. NAME AND MAILING ADDRESS OF APPLICANT *(Include ZIP code)*
   Department of The Army
   Walter Reed Army Medical Center
   Attn: Commanding Officer
   6900 Georgia Ave., NW
   Washington, DC 20307-5001

3. ADDRESS WHERE LICENSED MATERIAL WILL BE USED OR POSSESSED
   SEE ITEM #3 ATTACHMENT

4. NAME OF PERSON TO BE CONTACTED ABOUT THIS APPLICATION
   LTC John Mercier, Ph,D., RSO

   TELEPHONE NUMBER
   (202) 356-0058

SUBMIT ITEMS 5 THROUGH 11 ON 8-1/2 X11" 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. LICENSE FEES *(See 10 CFR 170 and Section 170.31)* 10CFR170(A)(5)
    FEE CATEGORY 7B | AMOUNT ENCLOSED $ EXEMPT

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
Thomas M. Fitzpatrick, M.D., DEPUTY CDR FOR CLIN. SVCS.		21 May 04

FOR NRC USE ONLY

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

ITEM #3 ATTACHMENT
ADDRESSES WHERE LICENSED MATERIAL WILL BE USED OR POSSESSED

Walter Reed Army Medical Center (WRAMC), Washington, D.C.; WRAMC Forest Glen Section and Annex, Silver Spring, Maryland; Rickman Building, 13 Taft Court, Rockville, Maryland; and The Gillette Building, 1413 Research Boulevard, Rockville, Maryland.

Note: The U.S. Army Medical Laboratory, Fort Meade, Maryland, has been removed from this renewal because the facility is now decommissioned. The Fort Meade facility is a drug testing laboratory that was authorized to use unsealed I-125 in microcurie quantities and sealed I-125 calibration sources in fractional microcurie quantities. The facility also had a gas chromatograph with an internal Ni-63 sealed source that never leaked and was disposed as radioactive waste on 9 March 1989. The last use of I-125 at the facility was in October 1999 and this was followed by a final contamination close out survey in November 1999. The WRAMC Health Physics Office (HPO) radioactive material inventory records indicate that the maximum credible I-125 spill would have been 250 microcuries, which by decay would now be less than a picocurie. HPO transfer and disposal records indicate that the I-125 sealed sources and unused unsealed I-125 were transferred to the HPO radioactive waste facility on 2 November 1999. The HPO disposed of the I-125 as normal waste in May 2002 after decay-in-storage of 15 half-lives and a radiation survey of the waste that was indistinguishable from background. The authorization expired in August 2000 and was not renewed because a new non-radioactive drug test had been implemented. However, a permanent decision that the facility would not require future use of radioactive material was not made clear until 2004. As a result, the WRAMC HPO evaluated the facility for decommissioning criteria stated in NUREG 1757, Vol. 1, Rev. 1, published September 2003. The facility met Group 1 decommissioning guidance [e.g., radioactive material with half-life less than 120 days, maximum activity decayed to levels less than 10CFR 20 – Appendix C (1 μCi for I-125), and 10CFR30.36(j) close out survey completed with records available for review by NRC inspectors]. Under NUREG 1757 Group 1 decommissioning guidance, the facility does not require a decommissioning plan and may be removed from the license.

ITEMS #5 and #6 ATTACHMENT
RADIOACTIVE MATERIAL and
PURPOSES FOR WHICH LICENSED MATERIAL WILL BE USED

CHEMICAL AND MASS NUMBER	CHEMICAL AND PHYSICAL FORM	MAXIMUM ACTIVITY	AUTHORIZED USE
A. Any byproduct material with atomic numbers 1-83	A. Any	A. 400 mCi of each radionuclide with a total possession limit of 26 curies	A. Through K. Medical research, diagnosis, and therapy; research and development as defined in 10 CFR 30.4, to include animal studies; instrument calibration; reference; teaching and training
B. Hydrogen 3	B. Any	B. 2 curies	
C. Phosphorus 32	C. Any	C. 1 curie	
D. Strontium 90	D. Sealed sources	D.	
E. Molybdenum 99	E. Molybdenum 99/Technetium 99m Generators	E. 23 curies	
F. Technetium 99m	F. Any	F. 23 curies	
G. Iodine 131	G. Any	G. 2 curies	
H. Xenon 133	H. Any	H. 2 curies	
I. Cesium 137	I. Sealed sources	I.	
J. Gadolinium 153	J. Sealed sources	J.	
K. Iridium 192	K. Any	K.	

CHEMICAL AND MASS NUMBER	CHEMICAL AND PHYSICAL FORM	MAXIMUM ACTIVITY	AUTHORIZED USE
L. Cesium 137	L. Sealed sources	L.	L. through N. Instrument calibration; reference; teaching and training
M. Americium 241	M. Sealed source	M.	
N. Plutonium 239 and Americium 241	N. Sealed or plated sources	N. 0.01 mCi for each radionuclide with a total possession limit of 0.02 mCi	
O. Uranium depleted in Uranium 235	O. Bulk Metal	O. 400 kgms	O. Linear accelerator shielding; Research and development as defined in 10 CFR 30.4; instrument calibration; reference; teaching and training
P. Cesium 137	P. Sealed sources	P. per source with a total possession limit of	P. through Q. Self-shielded irradiators for use as described in respective SSD registration certificates
Q. Cobalt 60	Q. Sealed sources	Q. per source with a total possession limit of	

The NRC recently completed a satisfactory review of our Financial Assurance Submittal with Statement of Intent and Decommissioning Funding Plan (DFP) [Refer to NRC letter dated April 13, 2004, signed by the Chief of the Region I Nuclear Materials Safety Branch, NRC Control Nos. 132079 and 132080]. The radioactive material listed in this license renewal application does not constitute changes that would detract from the DFP. Hence, changes to the current DFP are not necessary.

Note the following significant radioactive material changes from Item 5 of our previous license:

1. Removal of Cesium-137 sealed sources (J.L. Shepherd & Associates Model 6810, Series 143), 600 curies per source with a total possession limit of 4,800 curies. The specified Cs-137 was for a blood irradiator that was transferred back to J.L. Shepard & Associates on 28 December 2004.

2. Removal of Iodine-125 sealed sources (3M Company seeds) with a maximum possession limit of 1 curie and Palladium 103 sealed sources with a maximum possession limit of 3 curies. In the past, these types of seeds were used for prostate permanent implants. Unused seeds were held for decay in storage prior to disposal. Current prostate treatments now use accelerator-produced Palladium-103 seeds which are not regulated by the NRC.

3. Removal of Iodine-125 sealed sources (Norland Inst. Co. # 178A591A, AECL #235, AECL #324 or Amersham Corp. #IMC.P2) with a total possession limit of 4 sources not to exceed 300 mCi each. These sources were used in bone analyzers and were routinely replaced about every 6 months. Eventually, the bone analyzers were replaced with x-ray technology. The last remaining I-125 source used for this purpose was disposed via the Army radioactive waste broker as documented on WRAMC's copy of the shipment manifest dated 9 March 1994.

4. Removal of Cobalt-60 sealed sources with a maximum possession limit of 500 mCi. These sources were used for calibration and training. Higher activity Co-60 sources were disposed via the Army radioactive waste broker as documented on WRAMC's copy of the shipment manifest dated 17 May 1994. Lower activity Co-60 sources are adequately covered by subitem A of Item 5 for isotopes with atomic numbers 3-83 with a maximum possession limit of 400 mCi for each isotope.

5. Removal Cs-137, sealed sources, with a maximum possession limit of 1.2 Ci. These calibration, reference and training sources are adequately covered under subitems A in Item 5 for isotopes with atomic numbers 3-83 with a maximum possession limit of 400 mCi for each isotope.

6. Removal of Krypton-85, any form, with a maximum possession limit of 1 Ci. The Kr-85 gas was used for calibration and training and was sealed in metal rods. Inventory records indicate that the last of these sources were disposed as radioactive waste in July 1985.

7. Removal of Americium 241, sealed sources, with a maximum possession limit of 200 mCi. These sources were used as reference sources and as internal standards in older counting systems. Inventory records indicate that the last of these sources were disposed as radioactive waste in January 1984.

8. Removal of Nickel-63 and I-129 sealed sources and foils as a separate items on the license with maximum possession limits of 1 curie each. These isotopes are adequately covered under subitem A in Item 5 for isotopes with atomic numbers 3-83 with a maximum possession limit of 400 mCi for each isotope.

9. Removal of Ir-192 sealed sources as a separate item on the license with a maximum possession limit of 6 curies. This isotope is adequately covered under the subitem K in Item 5 for Ir-192 in any form with a maximum possession limit of 2 curies. Ir-192 sealed sources are usually purchased as seeds encased in nylon ribbons for used in brachytherapy treatments. After treatments, the seeds are returned to the vendor. As well, the use of Ir-192 for intravenous brachytherapy (IVB) procedures was terminated in December 2003 with the sources being returned to the vendor on 16 March 2004. The HPO may also use some Ir-192 seeds for instrument calibration, reference, or teaching and training.

10. Removal of Thorium, any form, with a maximum possession limit of 5 kgms. Other than check sources in exempt microcurie amounts, WRAMC has no records to support the use of thorium in NRC licensed activities.

11. Removal of Uranium, any form, with a maximum possession limit of 50 kgms. WRAMC has no records to support the use of Uranium in NRC licensed activities. Records do indicate that chemical reagents like uranyl acetate, such as those used in electron miscroscopy, has been used at WRAMC. However, the use of this generally licensed radioactive material does not require integration into the broad scope license compliance program.

12. Removal of Carbon 14, Sulfur 35, Chromium 51, Iodine 125, each listed for any form with roughly 1 to 2 curie maximum possession limits. Based on past inventory records, these isotopes are adequately covered under subitem A in Item 5 for isotopes with atomic numbers 3-83 with a maximum possession limit of 400 mCi for each isotope.

13. Reduction of Hydrogen 3 and Phosphorus 32 maximum possession limits. The reduced amounts are based on a review of past inventory records.

Also, note for the record that on 20 May 2000, Varian Medical Systems took custody of a Varian linear accelerator (CL6/100, serial # 240) that was removed from the WRAMC Radiation Oncology Service. The accelerator contained about 106 kg of depleted uranium (DU) shielding. The transfer of the DU complied with the vendor's agreement state license. Currently, WRAMC operates three Varian linear accelerators. Two of the accelerators contain a total of about 220 kg of DU shielding (CLINAC 6/100 and 600C). The third accelerator does not contain DU. The HPO also holds several kg of DU metal for reference, teaching and training.

ITEM #7 ATTACHMENT
INDIVIDUALS RESPONSIBLE FOR RADIATION SAFETY PROGRAM

1. Duties and Responsibilities of the Radiation Safety Committee (RSC) include the following:

a. Oversight of the radiation safety and NRC license compliance program. This includes the following topical areas: radiation safety training, radiation dosimetry, overexposure investigations, major radioactive material spills and unusual occurrences, internal and external audits and annual reports.

b. Assisting, enabling and/or empowering the Radiation Safety Officer (RSO) and authorized users to achieve radiation safety compliance.

c. Recommending solutions to open issues, such as unresolved audit findings, and tracking issues to closure.

d. Ensuring that patient and staff doses are kept as low as reasonably achievable (ALARA).

e. Review and approval of radiation safety program revisions, authorization applications, authorization amendments, and authorized users.

2. The RSC is established pursuant to 10CFR33.13(c)(1) whereby the majority of members are trained and experienced in the safe use of radioactive material. The RSC controls it's own membership to allow for personnel turnover, as well as, gains and losses in functional use of radioactive material. The minimum voting membership of the RSC tends to be the Deputy Commander for Clinical Services (DCCS, Chair and Management Rep), the RSO, a staff health physicist, a staff radiation therapy physicist, a radiation oncology physician, a nuclear pharmacy representative, a nuclear medicine physician, a nursing representative, a Walter Reed Army Institute of Research (WRAIR) representative and an Armed Forces Institute of Pathology (AFIP) representative. A quorum requires at least half the voting members, of which, the RSO and the DCCS (or his management substitute) must attend.

3. The RSC should meet quarterly and shall meet at least semi-annually and at the call of the Chair. RSC meetings may be in person or by electronic forum.

4. Except for appointment of a permanent RSO, the RSC maintains authority for designating the responsible radioactive material users (e.g., authorized users, authorized nuclear pharmacists, authorized medical physicists, principle investigators, and co-investigators). The criterion used by the RSC in approving users is discussed below. As well, RSO approval is required for all authorized users, authorized nuclear pharmacists, authorized medical physicists, principle investigators, and co-investigators.

5. For HUMAN USE (e.g., diagnosis, therapy and human studies), licensed material shall be used by or under the supervision of individuals designated by the Walter Reed Army Medical

Center (WRAMC) Radiation Safety Committee (RSC). The training and experience of authorized users, authorized nuclear pharmacists, and authorized medical physicists will be evaluated using the criteria in 10 CFR 35. The RSO may designate authorized users (i.e., on an interim basis) with final approval by the RSC at the next routine RSC meeting.

6. For HUMAN USE EMERGING TECHNOLOGIES (e.g., diagnosis, therapy and human studies), licensed material shall be used by or under the supervision of individuals designated by the Walter Reed Army Medical Center (WRAMC) Radiation Safety Committee (RSC). The training and experience of authorized users will be evaluated using the criteria in 10 CFR 35 that most closely matches the new technology, as well as, complete vendor training specific to the new equipment and/or procedure or equivalent training provided by an authorized user previously approved for the new technology. The RSO will not provide interim approvals for new technology users. Approval for authorized users by the RSC, with RSO concurrence, is required prior to implementation of the new technology. The RSC, with RSO concurrence, may provide interim approval of authorized users undergoing new technology training that takes place at WRAMC.

7. For NON-HUMAN USE (e.g., research and development), Principle Investigators and Co-Investigators who meet training and experience criteria expressed in NUREG 1556, Volume 7, Section 8.7.2 (December 1999), may be designated as authorized users by the RSO (i.e., on an interim basis) with final approval by the RSC at the next routine RSC meeting. Although not a rule, investigators who meet the following criteria will normally receive final approval: 1) bachelors degree, 2) at least two months of hands-on laboratory experience using equivalent types and amounts of radioactive material, and 3) completion of a one-day didactic radiation safety course or equivalent training.

8. For SELF-SHIELDED IRRADIATORS, the training and experience criteria expressed in NUREG 1556, Volume 5, Appendix G (October 1998), will guide the RSO in designating authorized users (i.e., on an interim basis) with final approval by the RSC at the next routine RSC meeting. In addition to the RSO and authorized users of the irradiators, staff members of both the HPO and the irradiator facility safety office may also serve as instructors and assess potential irradiator operators for adequate skills. However, such HPO and safety office staff members must have passed a written exam and demonstrated hands-on knowledge of irradiator operation and safety in order to perform instructor and assessor duties independently.

9. The RSC uses the following process to review proposed human and non-human uses of byproduct material:

a. The authorized user submits an authorization application or amendment for the proposed use of byproduct material. The documentation addresses the following:

1) **Purpose for which the byproduct material will be used,**
2) **Isotope, chemical and physical form, and quantities,**
3) **A general description of the protocol (research use), and**
4) **Proposed locations for use, storage and disposal of the byproduct material .**

b. The application or amendment is then reviewed by the HPO. The HPO staff assesses the need for dosimetry or bioassay, an appropriate frequency for contamination surveys, and if any special health physics or non-standard radiation safety procedures or equipment are warranted.

c. Once satisfied that the byproduct material will be properly controlled and that patient and worker safety are adequately addressed, the RSO may grant interim approval.

d. The RSO presents the application or amendment for discussion at the next routine RSC meeting. The RSC determines by vote if the application or amendment should be approved, disapproved, conditionally approved (with approval authority passed to the RSO once the RSC conditions are met), or if more information is needed for discussion at a follow-up RSC meeting.

10. The RSC criteria to approve proposed human and non-human uses of byproduct material, new procedures, and new facilities, is the following:

a. The RSC decision must be guided by a perceived benefit outweighing a perceived risk or that the perceived risk is negligible. As well, the decision should not result in a significant detriment to safety and health or substantial increase in environmental risk. Hence, the RSC decision should be risk-based and the ALARA concept should be taken into consideration.

b. The criteria provided in the NUREG 1556 Series (e.g., Volumes 5, 7, 9 & 11), 10CFR20 through 10CFR35, NRC Information Notices, or other appropriate references (e.g., ANSI standards, NCRP reports, HPS position statements) will serve as a basis for the RSC's approval or disapproval decisions.

c. For all RSC decisions that directly affect the Radiation Safety Program, to include approval of radioactive material users, the RSO must be in agreement.

11. Except for NRC approval of the RSO, the Radiation Safety Committee (RSC) intends to continue to assume full decision and approval authority for all aspects of the broad scope license and radiation safety program. WRAMC has a long history of NRC compliance excellence and this, in part, is a result of the RSC having the authority to promptly address, and reach closure on, issues that would otherwise enter a license amendment process. Under this renewal of the broad scope license, the WRAMC RSC requests continued flexibility by remaining exempt from submitting routine license amendments related to Items #7 through #11. For flexibility in making radiation safety program changes without prior NRC approval, the following statements are provided:

a. Locally approved revisions to the radiation safety program will be limited to the following topics: training program, audit program, radiation monitoring program, radioactive material receipt and tracking program, contamination survey program, radioactive material safe use procedures, radiological emergency procedures. Other radiation safety program topics will require NRC approval prior to implementation of changes.

b. Prior to implementation, revisions to the program will be reviewed and approved by the RSC and documented in the RSC minutes.

c. Prior to implementation, appropriate staff will be trained on revised procedures.

d. Radiation safety program revisions will be in accordance with the Codes of Federal Regulations, will not change license conditions and will not decrease the effectiveness of the program.

e. The audit program will be amended to evaluate radiation safety program revisions, as appropriate.

f. An exception to 11.b above occurs when the RSC delegates independent authority to the RSO on selected programs or topics. This delegated authority is limited to programs or topics that are exclusively, or predominately, the management purview of the RSO. For example, the RSO will maintain authority to approve changes in the radiation safety training and audit programs and then subsequently inform the RSC and document the changes in the RSC minutes.

12. Duties and Responsibilities of the RSO include the following:

a. Supervision of the radiation safety and NRC license compliance program. This includes the following sub-programs and topical areas: health physics support to brachytherapy patients and radioiodine ablation patients, radiation safety training, radiation dosimetry, bioassays, overexposure investigations, radioactive material spill investigations, radioactive waste, audits, area surveys, authorization application reviews, authorization amendment reviews, radioactive material ordering and receipt, radioactive material tracking and inventory, sealed source leak tests, radioactive material transport, effluent monitoring, decontamination and decommissioning, facility design reviews, and shielding evaluations.

b. Action officer for the RSC.

c. Termination of unsafe procedures or activities involving radioactive material.

d. Ensuring that patient and staff doses are kept ALARA.

e. Ensuring the radiation safety program is adequately documented.

13. 10CFR35.24(c) Waiver. To meet military operational contingencies, support homeland security missions, or support national security objectives, the RSO may be sent on extended deployments (60 to 180 days) without warning. The RSO need not be present as long as communications between the RSO and WRAMC management can be maintained (e.g., phone, email, video teleconferencing, etc.). In such cases, the RSC will designate an acting RSO who meets the training and experience criteria in 10CFR35. Since WRAMC has sufficient depth in authorized users and professional health physics staff, the RSO can ensure that one or more authorized users or staff health physicists are fully qualified to serve as acting RSO via a signed

preceptor statement (NRC 313A). In the event communications cannot be maintained, 10CFR35.24(c) will apply starting from the time that communications fail.

14. The senior management's delegation of authority to the RSO includes the statement below and is available for review by NRC inspectors:

"The Radiation Safety Officer (RSO) is given, and may exercise at any time, full authority to manage and audit the radiation safety program, to communicate directly with all radioactive material users, to direct personnel to comply with Nuclear Regulatory Commission (NRC) rules and regulations, to enforce NRC license requirements and radiation safety regulations, to immediately terminate any unsafe or non-compliant operation involving radioactive material, and to lead radiological emergency response operations."

15. A NRC Form 313A, curriculum vitae and copy of board certification for the Radiation Safety Officer (RSO), LTC John R. Mercier, Ph.D., is attached.

ITEM #8 ATTACHMENT
TRAINING FOR INDIVIDUALS WORKING IN OR FREQUENTING RESTRICTED AREAS

The radiation safety training program is managed by the WRAMC Health Physics Office and is designed to ensure compliance with 10CFR 19, 20, 30 and 35. Workers likely to receive an annual occupational dose in excess of 1 mSv (100 mrem) receive initial and refresher training commensurate with their duties. To ensure the training is tailored for different audiences and/or targeted for site-specific functions, the Health Physics staff often refines radiation safety lectures and training materials. However, research staffs receive training that generally follows NUREG 1556, Volume 7, Appendix J (December 1999) and medical staffs receive training that generally follows NUREG 1556, Volume 9, Appendix J (October 2002). The RSO maintains authority to approve changes to the radiation safety training program. The radiation safety training program may be examined in detail during routine NRC inspections.

ITEM #9 ATTACHMENT
FACILITIES AND EQUIPMENT

1. Irradiators. WRAMC will ensure that each area where a self-shielded irradiator is located corresponds to the 'Conditions of Normal Use' and 'Limitations and/or Other Considerations of Use' on the respective irradiator Sealed Source and Device (SSD) Registration Certificate; the floor beneath each self-shield irradiator is adequate to support the weight of the irradiator; each self-shielded irradiator is secured to prevent unauthorized access or removal; and each area where a self-shielded irradiator is located is equipped with an automatically operated fire detection and control system (sprinkler, chemical, or gas) or the location of the area and other controls ensure a low-level radiation risk attributable to fires. Currently, the self-shielded irradiators are located as follows:

A. Building 503 (WRAIR), Forrest Glen Annex, Silver Spring, MD.

B. Building 503 (WRAIR), Forrest Glen Annex, Silver Spring, MD.

Procedures for routine maintenance of the self-shielded irradiators that follow manufacturer's written instructions are implemented and maintained. Non-routine maintenance is only performed by the irradiator manufacturer or by other persons authorized by the NRC or an Agreement State.

2. Facilities. The Radiation Safety Committee (RSC) maintains authority for approving radioactive material use, storage and waste facilities. Facilities are evaluated on their adequacy to protect health and minimize danger to life and property IAW 10CFR 30.33(a)(2) and 35.18(a)(3). As appropriate, the RSC considers factors such as ALARA design, planned use of facility, type and quantity of radioactive material, protective equipment, access control, contamination control, ventilation, filtration, shielding, alarms and radiation monitoring instruments when evaluating a facility for licensed activities. Isotope laboratories and use areas tend to have impervious floors, walls and countertops. Facility diagrams are attached for the Radiopharmacy Hot Lab, 7th Floor, and the Radiation Therapy Sealed Source Storage Room, 1st Floor, Building 2, WRAMC. Additional laboratory and facility diagrams may be examined during routine NRC inspections.

3. Instruments. To ensure compliance with 10CFR 20 and 35 requirements, WRAMC maintains a variety of radiation monitoring and survey instruments, as well as, gamma well counters and liquid scintillation counters. Radiation monitoring instruments will be calibrated by the manufacturer or other appropriately qualified person, business or agency. Additionally, WRAMC reserves the right to develop and implement survey meter calibration procedures compliant with 10CFR 20.1501 and 35.61. The RSO maintains authority for amending instrument specifications and the calibration program.

4. Dose Calibrators. Equipment used to measure dosages will be calibrated IAW nationally recognized standards or the manufacturer's instructions.

ITEM #10 ATTACHMENT
RADIATION SAFETY PROGRAM

1. Audit Program. In accordance with 10CFR 20.1101, the RSO evaluates, or arranges for guest auditors to evaluate, the radiation safety program at least once a year. The HPO staff also conducts routine internal audits of user authorizations on a semiannual basis. These internal audits address radioactive material security, labeling and posting requirements, availability of written radiation safety procedures, inventory logs, possession limits, survey logs, survey meter calibration, staff training status, and staff adherence to standard radiation safety procedures (e.g., use of gloves, lab coats, no food and drink in lab, etc.). The RSC is briefed on audit results. Audit findings are addressed and tracked to resolution by the RSO and/or the RSC. The HPO staff also conducts less formal spot checks for radioactive material security, labeling, meter calibrations and log books during routine area surveys (weekly, monthly or quarterly depending on the authorization). The RSO maintains authority for amending the audit program.

2. Ordering Radioactive Material. To ensure control of procurement and authorized use of radioactive material, the HPO maintains a centralized system for ordering. Unless exempted, all authorized users must receive HPO approval prior to ordering radioactive material and all shipments must be to a HPO receiving area. In this way, HPO can assure that possession limits are not exceeded and that users maintain compliance with their authorizations. Exemptions to this process have been granted. For example, the Nuclear Pharmacy currently holds an exemption and, independent of prior HPO approval, can order radioactive material within their authorization limits and receive packages. However, reports of radiopharmacy purchases are provided to the HPO.

3. Radioactive Material Receipt and Accountability. In accordance with 10CFR 20, 30 and 33, WRAMC has established cradle-to-grave tracking of radioactive materials. For non-exempt sealed sources, physical inventories are conducted at least every six months.

4. Occupational Dose. Occupational doses at WRAMC have been tracked for many years and are well known for the various occupational groups. Unmonitored workers are not likely to exceed 10% the allowable annual limits specified in 10CFR 20. Externally dosed workers specified by 10CFR 20.1502(a) will enter the dosimetry program and receive an extremity and/or whole body dosimeter. Internally dosed workers specified by 10CFR 20.1502(b) will enter the dosimetry program and be assessed for internal uptake via bioassay. Dosimetry services, currently provided by the Army, are NVLAP accredited.

5. Area Surveys. WRAMC has developed and implemented written procedures for area surveys IAW 10CFR 20.1101 that meets the requirements of 10CFR 20.1501 and 35.70.

6. Safe Use of Unsealed Radioactive Material. WRAMC has developed and implemented written procedures for safe use of unsealed licensed material that meets the requirements of 10CFR 20.1101 and 20.1301.

7. Spill Procedures. WRAMC has developed and implemented written procedures for safe response to spills of licensed material that meets the requirements of 10CFR 20.1101

8. Leak Tests. WRAMC has developed and implemented written procedures for leak tests that meet the requirements of 10CFR 20 and 35.67.

ITEM #11 ATTACHMENT
WASTE MANAGEMENT

1. Procedures. WRAMC has developed and implemented written waste disposal procedures for licensed material IAW 10CFR 20.1101, that also meet to applicable section of Subpart K to 10CFR 20 and 10CFR 35.92. Disposal of the licensed material in the irradiators will be by transfer of the irradiators to the supplier or to a licensee authorized to accept the irradiators.

2. Facility. Attached is a diagram of the Radioactive Waste Facility, Forrest Glen Annex. Solid waste is shipped from this facility, liquid waste is sampled for release to the sewer from this facility, and short-lived waste is decayed and released at this facility [Exception: Some short-lived waste is decayed and released by the Nuclear Pharmacy]. was originally designed, built and operated as a research reactor facility (decommissioned in 1979) with low vulnerability to hazards. The brick and concrete building is secured with locked metal doors, perimeter fence and locked gate. It has a forced circulation air system, heating and cooling system, alarm system, walk-in freezer, fire hydrant, and fire extinguisher.

NRC FORM 313A
(8-1999)

U.S. NUCLEAR REGULATORY COMMISSION

TRAINING AND EXPERIENCE

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

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

LTC JOHN R. MERCIER, PH.D., PE, DABR, SRO

2. For Physicians, State or Territory Where Licensed

3. CERTIFICATION

Specialty Board	Category	Month and Year Certified
American Board of Radiology	Diagnostic Radiological and Medical Nuclear Physics	June, 1995
Professional Engineer (Texas)	Nuclear Engineering License	March, 1995

4. DIDACTIC TRAINING

Description of Training	Location	Clock Hours	Dates of Training
Radiation Physics and Instrumentation	University of Texas at Austin	300	Sep 81 – Dec 84
	Cornell University, NY	300	Aug 89 – May 91
	Univ. of Texas Health Science Center	550	Aug 96 – Aug 99
Radiation Protection	University of Texas at Austin	50	Sep 81 – Dec 84
	Cornell University, NY	100	Aug 89 – May 91
	Univ. of Texas Health Science Center	150	Aug 96 – Aug 99
Mathematics Pertaining to the Use and Measurement of Radioactivity	University of Texas at Austin	200	Sep 81 – Dec 84
	Cornell University, NY	150	Aug 89 – May 91
	Univ. of Texas Health Science Center	100	Aug 96 – Aug 99
Radiation Biology	University of Texas at Austin	50	Sep 81 – Dec 84
	Cornell University, NY	150	Aug 89 – May 91
	Univ. of Texas Health Science Center	150	Aug 96 – Aug 99
Chemistry of Byproduct Material for Medical Use	Univ. of Texas Health Science Center	100	Aug 96 – Aug 99
Radiation Dosimetry	University of Texas at Austin	50	Sep 81 – Dec 84
	Cornell University, NY	150	Aug 89 – May 91
	Univ. of Texas Health Science Center	150	Aug 96 – Aug 99

5. PRACTICAL EXPERIENCE WITH RADITION (Actual use of radionuclides or equivalent experience)				
Description of Experience	**Name of Supervising Individual**	**Location and Corresponding Material License Number**	**Dates and Clock Hours of Experience**	**Related Radiation Safety Exam Score**
Nuclear Medical Science Officer, U.S. Army Environmental Hygiene Agency. Radiation protection, dosimetry and calibration duties for: Any byproduct material with atomic no.'s 1 – 84, any form, not to exceed 800 mCi each or 10 Ci total. Any byproduct material with atomic no.'s 1 – 100, any form, not to exceed 15 uCi each or 500 uCi total. J.L Shepard Cs-137 sealed 130 mCi calibration source. Various plutonium and uranium sources.	LTC Eugene Potter, CHP	Aberdeen Proving Ground, MD USNRC Licenses: #19-09880-01, #SMB-707and #SNM-860	Jan 85 – Dec 85 (900 hours)	N/A
Radiation Safety Officer, Darnall Army Community Hospital. Radiation protection, dosimetry radioactive waste management, health physics program management and calibration duties for: Any byproduct material with atomic no.'s 1 – 83 for use as radiopharmaceuticals in diagnosis and therapy. Various calibration sources.	MAJ Jerome Karwacki,M.D.	Fort Hood, TX USNRC License #42-19113-01	Jan 86 – Dec 88 (6000 hours)	N/A
Graduate Student, Cornell University. Senior reactor operator for TRIGA reactor, with 10^{14} neutron flux in core and 10^{12} neutron flux at beam ports. Gamma cell operator with 10 MCi Co-60 irradiation source.	Dr. K. Bingham Cady, Sc.D.	Ithaca, NY USNRC License #SOP-10973	Aug 89 - May 91 (1000 hours)	N/A
Project Engineer, Defense Nuclear Agency Plutonium Mining Project. Spectroscopy, calibration and respiratory protection duties for a unique environmental restoration project. Various plutonium and americium samples and sources.	Dr. Ed Bramlitt, Ph.D.	Johnston Island, Pacific Ocean	Jun 91 – Jun 92 (1000 hours)	N/A
Radiation Safety Officer (Broad Scope), Tripler Army Medical Center. Radiation protection, dosimetry radioactive waste management, health physics program management and calibration duties for: Any byproduct material with atomic no.'s 1 – 83 for use as radiopharmaceuticals in diagnosis and therapy. J.L Shepard Cs-137 sealed 2200 Ci irradiation source. Various calibration sources.	COL Tom Cashman, M.D.	Honolulu, HI USNRC License #53-00458-04	Jun 92 – Jun 96 (8000 hours)	N/A
Doctoral Candidate, University of Texas Health Science Center. Various research and calibration sources.	Dr. Dave Kopp, Ph.D.		Aug 96 – Aug 99 (100 hours)	N/A
Nuclear Scientist, U.S. Army Nuclear and Chemical Agency. Scientific editor and contributing author to a North Atlantic Treaty Organization allied engineering publication on sampling and identification of radiological agents.	Dr. Chuck Davidson, Ph.D.		Aug 99 – Aug 02 (500 hours)	N/A

Radiation Safety Officer (Broad Scope), Walter Reed Army Medical Center. Manages one of the largest health physics programs in both breadth and depth in the United States. Program oversight for medical diagnostic and therapeutic uses; Cs-137 and Co-60 irradiators; equipment calibration; human and animal research; pharmaceutical research and development; and related biomedical applications. Other institutions operating under the WRAMC NRC licenses include the Walter Reed Army Institute of Research, the Naval Medical Research Command and the Armed Forces Institute of Pathology.	COL Dallas Hack, M.D.	Washington D.C. USNRC Licenses #08-01738-02 #08-01738-03	Sep 02 – present (3000 hours)	N/A

6. FORMAL TRAINING

Degree, Area of Study	Name of Program and Location with Corresponding Materials License Number	Dates	Name of Organization that Approved the Program (e.g., Accreditation Council for Graduate Medical Education) and the Applicable Regulation (e.g., 10 CFR 35.294)
B.E.S., Nuclear Engineering	University of Texas at Austin		ABET Accredited
M.Eng., Nuclear Engineering	Cornell University, NY		ABET Accredited
Ph.D., Radiological Physics	Univ. of Texas Health Science Center	Ex. 6	CAMPEP Accredited

The American Board of Radiology

Organized through the cooperation of the
American College of Radiology, the American Roentgen Ray Society,
the American Radium Society, the Radiological Society of North America,
the Section on Radiology of the American Medical Association,
the American Society for Therapeutic Radiology and Oncology, the Association of
University Radiologists, and American Association of Physicists in Medicine
Hereby certifies that

John Rene Mercier, M.E.

Has pursued an accepted course of graduate study
and clinical work, has met certain standards and qualifications and
has passed the examinations conducted under the authority of
The American Board of Radiology
On this seventh day of June, 1995
Thereby demonstrating to the satisfaction of the Board
that he is qualified to practice the specialty of

Diagnostic Radiological and Medical Nuclear Physics

1934

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LIEUTENANT COLONEL JOHN R. MERCIER, Ph.D., PE, DABR, SRO
Leader, U.S. Army Radiological Advisory Medical Team
Chief, Health Physics, Walter Reed Army Medical Center
Radiation Safety Officer, Walter Reed Army Medical Center
Radiation Safety Officer, North Atlantic Regional Medical Command
Chair, DoD Weapons of Mass Destruction Human Response Panel
Senior NATO Umpire, Operational and Forensic Sampling of Radiological Agents

Walter Reed Army Medical Center
6900 Georgia Ave., NW
Bldg 41, Room 38
Washington, D.C. 20307-5001
wk: (202) 356-0058
john.mercier@us.army.mil

FORMAL EDUCATION

Doctor of Philosophy (Radiological Physics), The University of Texas Health Science Center, San Antonio, Texas.
Master of Engineering (Nuclear), Cornell University, Ithaca, New York,
Bachelor of Engineering Science (Nuclear), The University of Texas, Austin, Texas

EX 6

PROFESSIONAL CREDENTIALS

Diplomate, American Board of Radiology, Dual Certified in Diagnostic Radiological Physics and Medical Nuclear Physics, DABR Physicist # P1779, 1995
Licensed Medical Physicist, Texas, # MP0402, 1995
Licensed Professional Nuclear Engineer, Texas PE Registration # 80363, 1995
Licensed Nuclear Plant Senior Reactor Operator, TRIGA Reactor, NRC License #SOP-10973, 1990
Certified Hazard Control Manager, International Board of Hazard Control Management, Master Certification # 2490, 1993
"A" Proficiency Designator – Professional credential awarded to recognized experts by the Surgeon General of the United States Army, 2003

AFFILIATIONS AND PROFESSIONAL MEMBERSHIPS

Member, Sigma Xi – The Scientific Research Society
Member, Tau Beta Pi – The National Engineering Honor Society
Member, American Nuclear Society
Member, Health Physics Society
- Past President for Hawaii Chapter

Member, American Association of Physicists in Medicine
North Atlantic Treaty Organization (NATO):
- Senior NATO Umpire, Land Group 7 Expert Subgroup on Sampling and Identification of Biological, Chemical and Radiological Agents
- Past Head of U.S. Delegation, Expert Subgroup on Sampling and Identification of Radiological Agents
- Past Member, Land Group 7 on Joint Nuclear, Biological and Chemical (NBC) Defense
- Past Member, Land Group 7, Expert Working Group on Low-Level Radiation
- Past Member, Operational NBC Working Group
- Past Member, Medical NBC Working Party
- Past Member, Task Group on Radiation Treatments and Countermeasures

The Technical Cooperation Program (TTCP) of the American, British, Canadian, and Australian (ABCA) Alliance:
- Member, Technical Panel 13 on Radiation Hazards

Department of Defense:

Leader, U.S. Army Radiological Advisory Medical Team
Chair, DoD Weapons of Mass Destruction Human Response Panel
Lead Scientist, Special Weapons Operational Reconnaissance Detachment
Past Member, Nuclear Warfare Casualty Panel of Experts, Joint Readiness Clinical Advisory Board
Standing Member, DoD RADIAC Working Group
Member, Joint DoD/DOE Nuclear Weapon Accident Response Steering Group (NWARSG) and the NWARSG Technical Working Group

PUBLICATIONS

Mercier, J. R., *Mission and Capabilities of the U.S. Army Radiological Assistance Medical Team*, Proceedings of the 11th International Radiation Protection Association (IRPA), Madrid, Spain, May, 2004 (in print).

Haslip, D. S., and **Mercier, J. R.**, *A NATO Exercise on Radiological Sampling*, submitted to Health Physics in March, 2004.

Groeber, E., and **Mercier, J. R.**, *Development of Low-Cost Aerial Survey and Spectroscopy Systems*, Proceedings of the 37th Health Physics Society Midyear Topical Meeting: Radiological Air Monitoring and Dosimetry, Augusta, GA, February 8-11, 2004, p. 220-230.

Mercier, J. R. (Ed.), *Senior Umpire Report: 2003 NATO Field Trials for Sampling and Identification of Radiological Agents (SIRA)*, North Atlantic Treaty Organization (NATO) Document Number PfP(NAAG-LG/7-SIBCRA)D(2003)2, December, 2003.

Anno, G., R. Bloom, **J. R. Mercier**, R. W. Young, *Dose Response Relationships for Acute Ionizing Radiation Lethality*, Health Physics, 84(5), 2003, p. 565-575.

Mercier, J. R., and Moss, S. C., *The U.S. Army Radiological Advisory Medical Team*, Proceedings of the 36th Health Physics Society Midyear Topical Meeting: Radiation Safety Aspects of Homeland Security and Emergency Response, San Antonio, TX, January 26-29, 2003, p. 158-163.

Lankipalli, B. R., W. D. McDavid, S. B. Dove, E. Wieckowska, R. G. Waggener, and **J. R. Mercier**, *Comparison of Five Methods for the Derivation of Spectra for a Constant Potential Dental X-Ray Unit*, Dentomaxillofacial Radiology, 30, 2001, p. 264-269.

Mercier, J. R., Commander's Guide on Low-Level Radiation (LLR) Exposure in Military Operations, Edition 2, Standardization Agreement 2473, North Atlantic Treaty Organization, 2002.

Mercier, J. R., Commander's Guide on Nuclear Radiation Exposure of Groups During War, Edition 6, NATO Standardization Agreement 2083, North Atlantic Treaty Organization, 2001.

Mercier, J. R., D. T. Kopp, W. D. McDavid, S. B. Dove, J. L. Lancaster, and D. M. Tucker, *Modification and Benchmarking of MCNP for Low-Energy Tungsten Spectra*, Medical Physics, 27(12), 2000, p. 2680-2687.

Mercier, J. R., D. T. Kopp, W. D. McDavid, S. B. Dove, J. L. Lancaster, and D. M. Tucker, *Measurement and Validation of Benchmark-Quality Thick-Target Tungsten X-Ray Spectra below 150 kVp*, Radiation Research, 154, 2000, p. 564-581.

Mercier, J. R., D. T. Kopp, W. D. McDavid, S. B. Dove, J. L. Lancaster, and D. M. Tucker, *Using Measured 30-150 kVp Polychromatic Tungsten X-Ray Spectra to Determine Ion Chamber Calibration Factors*, Health Physics, 79(4), 2000, p. 402-406.

Mercier, J. R. (Ed.), *NATO Handbook for Sampling and Identification of Radiological Agents, Volume 1 (Operational)*, Allied Engineering Publication 49, North Atlantic Treaty Organization, 2000.

Mercier, J. R., Medical Aspects of Nuclear Weapons and Radiation Effects, Chapter 3 of the FY 01/02 Army Specific Military Requirements for Nuclear and Radiation Effects Information, published by the U.S. Army Deputy Chief of Staff for Operations and Plans (DCSOPS), August 2000.

Mercier, J. R., *Measurement and Monte Carlo Prediction of Diagnostic Tungsten X-Ray Spectra*, Ph.D. Dissertation, Graduate School of Biomedical Sciences, The University of Texas Health Science Center, San Antonio, TX, 1999. Available from UMI Dissertation Services, Ann Arbor, MI, 1999, UMI No. 9938769.

Seibert, J. A. (Chair), T. Bogucki, T. Ciona, J. Dugan, W. Huda, A. Karellas, **J. Mercier**, E. Samai, J. Sheppard, B. Stewart, O. Suleiman, D. Tucker, R. Uzenoff, J. Weiser, and C. Willis, *Acceptance Testing and Quality Control of Photostimulable Storage Phosphor Imaging Systems, Report of Task Group #10*, American Association of Physicists in Medicine, 1998.

Willis, C. E., **J. Mercier**, M. Patel, *Modification of Conventional Quality Assurance Procedures to Accommodate Computed Radiography*, Proceedings of the 13th Conference of Computer Applications in Radiology, Society for Computer Applications in Radiology, Denver, CO, 1996.

Mercier, J. R., and Bramlitt, E. T., *A Soil Cleanup on Johnston Atoll*, Proceedings of the First Symposium on Soil Cleanup in the Pacific Islands, American Society of Civil Engineers, Honolulu, HI, 1993.

Moroney, J. D., Johnson, N. R., Moroney, K. S., **Mercier, J. R.**, *An Improved Method for Removing Transuranics from Coral Soil at Johnston Atoll*, Proceedings of the 1992 Federal Environmental Restoration Conference, Hazardous Materials Control Resources Institute, Vienna, VA, 1992.

ABSTRACTS AND POSTERS

Mercier, J. R., The U.S. Army Radiological Advisory Medical Team, 6th Annual Force Health Protection Conference, Albuquerque, NM, August 11-17, 2003.

Liu, H. L., Y. Pu, T. Andrews, **J. Mercier**, P. T. Fox, and J.-H. Gao, Cerebral Blood Flow Measurement Using Adaptive Threshold for Singular Value Decomposition Technique on Dynamic Contrast Agent MR Perfusion Imaging, 7th Meeting of the International Society for Magnetic Resonance in Medicine, Philadelphia, PA, 1999.

Mercier, J. R., D. T. Kopp, D. M. Tucker, C. E. Willis and J. L. Lancaster, X-Ray Spectra Resolution Requirements for Characterization of Image Receptors, 84th Scientific Assembly and Annual Meeting of the Radiological Society of North America, Chicago, Il, 1998.

Mercier, J. and D. Kopp, Preliminary Evaluation of the Monte Carlo Code MCNP4b for Diagnostic X-Ray Spectra, 40th Annual Meeting of the American Association of Physicists in Medicine, Medical Physics, 1998, 25(7), p. A105.

Willis, C. E., **J. R. Mercier**, M. G. Patel, Unresolved Issues in Computed Radiography, 38th Annual Meeting of the American Association of Physicists in Medicine, Medical Physics, 1996, 23(6), p.1076.

PROFESSIONAL AND LEADERSHIP EXPERIENCE

Chief, Health Physics 8/02 – present
Walter Reed Army Medical Center, Washington, D.C.

Lead the U.S. Army Radiological Advisory Medical Team (RAMT) in rapid response missions to save lives anywhere in the world. Chair the DoD Weapons of Mass Destruction Human Response Panel which is responsible for defining casualty criteria and developing casualty prediction models. Serve as executive agent and Radiation Safety Officer for broad-scope USNRC radioactive material and irradiator licenses (#'s 08-01738-02 and 08-01738-02). Direct comprehensive health physics services for world-renowned medical and research centers to include Walter Reed Army Institute of Research, the Armed Forces Institute of Pathology and Walter Reed Army Medical Center. Serve as regional Radiation and Laser Safety Officer and provide oversight and mission support services to Army medical facilities within the 21-state North Atlantic Regional Medical Command's umbrella of responsibility. Identify and train military scientists, as well as, develop test plans, techniques and procedures for the DoD Special Weapons Operational Reconnaissance Detachment (SWORD) in support of Combatant Commanders. Manage ~$500K annually and supervise 20 health physics professionals.

Nuclear Scientist 8/99 – 8/02
U.S. Army Nuclear and Chemical Agency, Springfield, VA

Served as primary consulting subject matter expert (SME) to Army Staff and other DoD/NATO/U.S. Government agencies on the medical effects of nuclear weapons and radiation. Set policy on friendly troop safety risk criteria and enemy personnel casualty criteria for nuclear weapons effects. Developed casualty estimation models for nuclear, biological and chemical (NBC) weapons. Served on numerous DoD and NATO SME panels for NBC research, operational doctrine and equipment development. Developed Army R&D requirements for radiobiology, biomedical technology and NBC operations. Served as Alternate Army Reactor Officer for the Army Reactor Office that maintains oversight of WSMR and APG fast burst reactors. Served on the Nuclear Employment Augmentation Team in support of Combatant Commanders.

Doctoral Student ( ) EX6
The University of Texas Health Science Center, San Antonio, TX

Research focused on diagnostic imaging, the use of Monte Carlo codes to simulate x-ray beam formation and transport, measurement of x-ray spectra, computed radiography and other digital imaging systems. Teaching duties and course work broadly covered the medical radiological physics profession.

Chief, Health Physics 6/92 – 6/96
Tripler Army Medical Center, Honolulu, HI 96859-5000

Executive agent and Radiation Safety Officer for a broad-scope USNRC radioactive material license (#53-00458-04). Directed comprehensive health physics services for a major teaching and research hospital. Developed or approved nuclear medicine, diagnostic radiology and radiation therapy QC protocols. Performed gamma camera acceptance testing. Evaluated and approved all Pacific region radiological facility designs. Conducted health and medical physics audits. Routinely provided formal and informal radiation safety training and imaging science lectures to nuclear medicine and radiology technologists. Routinely counseled physicians, patients, and hospital staff on radiation effects. Occasionally lectured radiology residents in imaging physics.

Project Engineer, Johnston Atoll Plutonium Mining Project 5/91 - 6/92
Defense Nuclear Agency, Kirtland AFB, NM 87115-5000

Spearheaded the Defense Nuclear Agency's $15 million Plutonium Mining Project. Led world's first successful remediation of plutonium contaminated soil. Designed several multichannel analyzer radioassay systems using sodium iodide and high-pure germanium spectroscopy detectors. Developed and enforced various radiation safety, bioassay, and respiratory protection programs.

Graduate Student [redacted] Ex 6
Cornell University, Ithaca, NY

Research focused on characterizing radiation damage to electronic components using the Cornell gamma irradiation facility. Gained experience as a federally licensed nuclear plant senior reactor operator (License # SOP-10973) that required mastery of all research facilities and radiological monitoring equipment within the reactor building. Developed experimental research protocols for the TRIGA reactor and assisted in training a reactor operator. Course work broadly covered the nuclear engineering profession.

Radiation Protection Officer 12/85 - 12/88
Darnall Army Community Hospital, Ft Hood, TX 76544-5063

Executive agent and Radiation Safety Officer for USNRC limited-scope radioactive material license (#42-19113-01). Hospital consultant for health physics, diagnostic radiology physics, & medical nuclear physics. Developed radiation protection, radiology QA/QC, & nuclear medicine QA/QC programs. Performed health & medical physics audits, calibrations, x-ray system & shielding surveys. Troubleshooted image quality problems. Trained all radiation workers.

Nuclear Medical Science Officer 1/85 - 12/85
US Army Environmental Hygiene Agency, APG, MD 21010-5422

Consulted Army and DoD installations for adequate radiation protection, radiology QA/QC, and nuclear medicine QA/QC programs. Wrote safety and QC procedures and evaluated x-ray system performance. Conducted radiological shielding evaluations and health hazard assessments of equipment and facilities.

Commander, Detachment 1, A Company 12/82 – 12/84
249th Supply and Transport Battalion, 49th Armored Division,
Texas Army National Guard, Killeen, TX

Exercised command. Led with honor and respect.

Platoon Leader, HHQ Company 8/81 – 11/82
249th Supply and Transport Battalion, 49th Armored Division,
Texas Army National Guard, Austin, TX

Developed leadership skills.

RECENT PROFESSIONAL SHORT COURSES AND EXERCISES

Radiological Mass Casualty Medical Preparations Course, 17-20 Feb 2004
Course Director and Lead Instructor, Walter Reed Army Medical Center

Nuclear, Radiation and High-Yield Explosives (NRE) Course, 10 Feb – 4 May 2004
Invited Lecturer, Uniformed Services University of the Health Sciences

North Atlantic Treaty Organization (NATO) Sampling and Identification of Radiological Agents (SIRA) Field Trials, 21-26 Sep 2003
Senior NATO Umpire, NATO Land Group 7 (Joint NBC Defense)

Radiological Accident Command, Control, and Coordination Course, 18-21 Aug 2003
Student, Defense Nuclear Weapons School

Hazard Prediction Assessment Capability (HPAC) Software Basic Course, 15-18 Jul 2003
Student, Defense Threat Reduction Agency

Medical Effects of Ionizing Radiation Course, 6-7 May 2003
Student, Uniformed Services University of the Health Sciences

Center for Disease Control (CDC) Radiological Event Tabletop Exercise – Louisville, KY, 11 Feb 03
Leader, U.S. Army Radiological Advisory Medical Team, DoD

Train the Trainer: Transportation Emergency Preparedness Program, 25 Jan 2003
Student, Department of Energy -- National Nuclear Security Administration

Operation Diligent Warrior Nuclear Weapon Accident Exercise, 7-25 Oct 2002
Leader, U.S. Army Radiological Advisory Medical Team, DoD

NATO Staff Officer's NBC Defense Policy Course, 9-13 Jul 2001
Lecturer and Student, The NATO School – Supreme Headquarters Allied Powers Europe

Joint Nuclear Operations and Targeting Course, 12-16 Jun 2000
Student, Defense Nuclear Weapons School

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
475 ALLENDALE ROAD
KING OF PRUSSIA, PENNSYLVANIA 19406-1415

March 10, 2005

Docket No. 03001317 License No. 08-01738-02
Control No. 135964

COL Thomas M. Fitzpatrick, MC
Chairperson, Radiation Safety Committee
Department of the Army
Walter Reed Army Medical Center
MCHL-HP/Health Physics Office
Building 41 Room 38
Washington , DC 20307-5001

SUBJECT: DEPARTMENT OF THE ARMY, APPLICATION FOR LICENSING ACTION, CONTROL NO. 135964

Dear Colonel Fitzpatrick:

This refers to your license amendment request. Enclosed with this letter is the amended license. Please note that your license was written in a format compatible with the revised 10 CFR Part 35, effective October 24, 2002. The facility at Building T-2 may be released for unrestricted use.

In accordance with NRC Regulatory Issue Summary (RIS) 2004-17: Revised Decay-In-Storage Provisions for the Storage of Radioactive Waste Containing Byproduct Material (http://www.nrc.gov/reading-rm/doc-collections/gen-comm/reg-issues/2004/ri200417.pdf), your license has been modified. Your license now contains a revised decay-in-storage (DIS) condition. This revised condition permits greater flexibility for DIS of waste by eliminating a specific holding period prior to disposal. Please review the RIS 2004-17, and the revised condition carefully to ensure that you understand its requirements.

Please review the enclosed document carefully and be sure that you understand and fully implement all the conditions incorporated into the amended license. Please note the last condition on your license indicates that, "This license condition applies only to those procedures that are required to be submitted in accordance with the regulations." Therefore, any procedures submitted that were not required by regulation to be submitted, e.g., calibration of dose calibrators, will not be considered a part of your license and were not reviewed during the licensing process. These procedures will be reviewed during inspections, as necessary. If there are any errors or questions, please notify the U.S. Nuclear Regulatory Commission, Region I Office, Licensing Assistance Team, (610) 337-5239, so that we can provide appropriate corrections and answers.

Current NRC regulations and guidance are available at the NRC Web sites listed below or by contacting the Government Printing Office (GPO) toll-free at 1-888-293-6498. The GPO is open from 7:00 a.m. to 9:00 p.m. EST, Monday through Friday (except Federal holidays).

Information in this record was deleted
in accordance with the Freedom of Information
Act, exemptions 2
FOIA- 2006-0238

Thank you for your cooperation.

Sincerely,

Original signed by Ronald R. Bellamy

Ronald R. Bellamy, Chief
Decommissioning Branch
Division of Nuclear Materials Safety

Enclosure:
Amendment No. 78

NRC Web site addresses
NRC regulations
http://www.nrc.gov/reading-rm/doc-collections/cfr/
Licensing guidance
http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1556/
General Policy and Procedure for NRC Enforcement Actions
Http://www.nrc.gov/what-we-do/regulatory/enforcement/enforc-pol.pdf
206 of the Energy Reorganization Act of 1974
http://www.nrc.gov/who-we-are/governing-laws.html

cc:
LTC John R. Mercier, Ph.D., Radiation Safety Officer

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Amendment No. 78

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Pursuant to the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974 (Public Law 93-438), and Title 10, Code of Federal Regulations, Chapter I, Parts 30, 31, 32, 33, 34, 35, 36, 39, 40, and 70, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, possess, and transfer byproduct, source, and special nuclear material designated below; to use such material for the purpose(s) and at the place(s) designated below; to deliver or transfer such material to persons authorized to receive it in accordance with the regulations of the applicable Part(s). This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954, as amended, and is subject to all applicable rules, regulations, and orders of the Nuclear Regulatory Commission now or hereafter in effect and to any conditions specified below.

Licensee	In accordance with the letter received October 29, 2004
1. Department of the Army Walter Reed Army Medical Center (WRAMC)	3. License number 08-01738-02 is amended in its entirety to read as follows:
2. Washington, D.C. 20307-5001	4. Expiration date June 30, 2004 (extended)
	5. Docket No. 030-01317 Reference No. 08-01738-03

6. Byproduct, source, and/or special nuclear material	7. Chemical and/or physical form	8. Maximum amount that licensee may possess at any one time under this license
A. Any byproduct material with atomic numbers 1-83	A. Any	A. 400 millicuries of each radionuclide with a total possession limit of 26 curies
B. Iodine 131	B. Any	B. 2 curies
C. Xenon 133	C. Any	C. 2 curies
D. Krypton 85	D. Any	D. 1 curie
E. Phosphorus 32	E. Any	E. 2 curies
F. Carbon 14	F. Any	F. 2 curies
G. Iodine 125	G. Any	G. 1 curie
H. Iridium 192	H. Any	H. [ ] Ex 2
I. Chromium 51	I. Any	I. 750 millicuries
J. Sulfur 35	J. Any	J. 1 curie
K. Hydrogen 3	K. Any	K. 5 curies
L. Molybdenum 99	L. Molybdenum 99/ Technetium 99m Generators	L. 23 curies

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6. Byproduct, source, and/or special nuclear material	7. Chemical and/or physical form	8. Maximum amount that licensee may possess at any one time under this license
M. Technetium 99m	M. Any	M. 23 curies
N. Strontium 90	N. Sealed sources	N.
O. Cesium 137	O. Sealed sources	O.
P. Gadolinium 153	P. Sealed sources	P.
Q. Iodine 125	Q. Sealed sources (3M Company seeds)	Q. 1 curie
R. Iodine 125	R. Sealed sources (Norland Inst. Co., Model 178A591A or AECL Models C235 or C324 or Amersham Corp. Model IMC.P2)	R. 4 sources, not to exceed 300 millicuries each
S. Cesium 137	S. Sealed sources	S.
T. Cobalt 60	T. Sealed sources	T.
U. Americium 241	U. Any	U. 100 microcuries
V. Americium 241	V. Sealed sources	V.
W. Nickel 63	W. Sealed sources and foils	W. 1 curie
X. Iodine 129	X. Sealed sources	X. 1 curie
Y. Thorium	Y. Any	Y. 5 kilograms
Z. Uranium	Z. Any	Z. 50 kilograms
AA. Cesium 137	AA. Sealed sources	AA.
BB. Americium 241	BB. Sealed sources	BB.

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6. Byproduct, source, and/or special nuclear material	7. Chemical and/or physical form	8. Maximum amount that licensee may possess at any one time under this license
CC. Palladium 103	CC. Sealed sources	CC. 3 curies
DD. Iridium 192	DD. Sealed sources	DD.
EE. Uranium depleted in Uranium 235	EE. Plated Metal	EE. 400 Kilograms
FF. Cobalt 60	FF. Sealed Sources	FF. No single source to exceed the maximum activity per source or maximum activity per device specified in the certificate of registration issued by the U.S. Nuclear Regulatory Commission or an Agreement State
GG. Cesium 137	GG. Sealed Sources	GG. No single source to exceed the maximum activity per source or maximum activity per device specified in the certificate of registration issued by the U.S. Nuclear Regulatory Commission or an Agreement State

9. Authorized use:

A. through DD.	Medical diagnosis, therapy and research in humans in accordance with any applicable Food and Drug Administration (FDA) requirements. Research and development as defined in 10 CFR 30.4, including animal studies; instrument calibration; student instruction.
EE.	Shielding in linear accelerators.
FF. and GG.	For irradiation of materials in self-shielded irradiator devices that have been registered either with the U.S. Nuclear Regulatory Commission under 10 CFR 32.210 or with an Agreement State and which have been distributed in accordance with a Commission or Agreement State specific license authorizing distribution to persons specifically authorized by a Commission or Agreement State license to receive, possess, and use the devices.

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10. A. Licensed material in Items 6.A through 6.EE may be used only at the licensee's facilities located at the Walter Reed Army Medical Center, Washington, D. C.; WRAMC Forest Glen Section and Annex, Silver Spring, Maryland; U.S. Army Medical Laboratory, WRAMC Department of Pathology, Fort Meade, Maryland; Rickman Building, 13 Taft Court, Rockville, Maryland and Gillette Building, 270 Research Center, 1413 Research Boulevard, Rockville, Maryland.

B. Licensed material in Items 6.FF and 6.GG may be used or stored only at the licensee's facilities located at Walter Reed Army Medical Center, Washington, D.C. and Walter Reed Army Institute for Research, Forest Glen Annex, Silver Spring, Maryland.

11. A. Licensed material in Items 6.A through 6.EE shall be used by, or under the supervision of, individuals designated in writing by the Radiation Safety Committee, Colonel Thomas M. Fitzpatrick, Chairperson.

B. Licensed material in Items 6.FF and 6.GG shall be used by, or under the supervision of, individuals who have received the training described in the application dated October 15, 2001 and have been designated, in writing, by the Radiation Safety Officer.

C. The use of licensed material in or on humans shall be by a physician, dentist, or podiatrist as defined in 10 CFR 35.2.

D. Physicians, dentists, or podiatrists designated to use licensed material in or on humans shall meet the training criteria established in 10 CFR 35, Subpart J and shall be designated in writing by the licensee's Radiation Safety Committee.

E. Individuals designated to work as medical physicists for intravascular brachytherapy shall meet the training and experience criteria established in 10 CFR 35.961; or be named on a current U.S. Nuclear Regulatory Commission or Agreement State license, or a permit issued under a broad scope license as a medical physicist; and shall be designated, in writing, by the Radiation Safety Committee. In addition, the physicist must meet the recentness of training requirement in 10 CFR 35.972 and have recent, device-specific training and experience for each make and model of intravascular brachytherapy device used by the licensee.

F. The Radiation Safety Officer for this license is Lieutenant Colonel John R. Mercier.

12. In addition to the possession limits in Item 8, the licensee shall further restrict the possession of licensed material at a single location to quantities below the limits specified in 10 CFR 30.72 which require consideration of the need for an emergency plan for responding to a release of licensed material.

13. The licensee is exempted from decommissioning financial assurance requirements for possession of licensed material in sealed sources in quantities greater than the limits in 10 CFR 30.35(d) for the purposes of source changes only. This exemption is granted for no more than 30 days for any one source change.

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14. Notwithstanding the requirements of 10 CFR 35.49(a) and (b), 35.100, 35.200, 35.300, 35.400 and 35.500 the licensee may use for any medical use any byproduct material or reagent kit. The licensee shall possess and use byproduct material for medical use in accordance with the prescriptive and performance criteria in the other sections of 10 CFR 35. This does not relieve the licensee from complying with applicable U.S. Food and Drug Administration (FDA) and other Federal and State requirements.

15. A. Detector cells containing a titanium tritide foil or a scandium tritide foil shall only be used in conjunction with a properly operating temperature control mechanism which prevents the foil temperatures from exceeding that specified in the certificate of registration referred to in 10 CFR 32.210.

    B. When in use, detector cells containing a titanium tritide foil or a scandium tritide foil shall be vented to the outside.

16. The licensee shall conduct a physical inventory every three months to account for all sealed sources and devices containing licensed material received and possessed pursuant to 10 CFR 35.59, 35.400 and 35.500 and every six months for all other sealed sources and devices.

17. A. Sealed sources and detector cells containing licensed material shall be tested for leakage and/or contamination at intervals not to exceed six months or at such other intervals as are specified by the certificate of registration referred to in 10 CFR 32.210, not to exceed three years.

    B. Notwithstanding Paragraph A of this Condition, sealed sources designed to emit alpha particles shall be tested for leakage and/or contamination at intervals not to exceed three months.

    C. In the absence of a certificate from a transferor indicating that a leak test has been made within six months prior to the transfer, a sealed source or detector cell received from another person shall not be put into use until tested.

    D. Each sealed source fabricated by the licensee shall be inspected and tested for construction defects, leakage, and contamination prior to any use or transfer as a sealed source.

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E. Sealed sources and detector cells need not be leak tested if:

(i) they contain only hydrogen-3; or

(ii) they contain only a radioactive gas; or

(iii) the half-life of the isotope is 30 days or less; or

(iv) they contain not more than 100 microcuries of beta and/or gamma emitting material or not more than 10 microcuries of alpha emitting material; or

(v) they are not designed to emit alpha particles, are in storage, and are not being used. However, when they are removed from storage for use or transfer to another person, and have not been tested within the required leak test interval, they shall be tested before use or transfer. No sealed source or detector cell shall be stored for a period of more than 10 years without being tested for leakage and/or contamination.

F. The test shall be capable of detecting the presence of 0.005 microcurie of radioactive material on the test sample. If the test reveals the presence of 0.005 microcurie or more of removable contamination, a report shall be filed with the U.S. Nuclear Regulatory Commission and the source or detector cell shall be removed immediately from service and decontaminated, repaired, or disposed of in accordance with Commission regulations. The report shall be filed within five days of the date the leak test result is known with the U.S. Nuclear Regulatory Commission, Region I, ATTN: Chief, Nuclear Materials Safety Branch, 475 Allendale Road, King of Prussia, Pennsylvania 19406. The report shall specify the source or detector cell involved, the test results, and corrective action taken.

G. The licensee is authorized to collect leak test samples for analysis by the licensee. Alternatively, tests for leakage and/or contamination may be performed by persons specifically licensed by the Commission or an Agreement State to perform such services.

18. Sealed sources or detector cells containing licensed material shall not be opened or sources removed from source holders by the licensee.

19. The licensee shall not repair, remove, replace or alter any of the following: electrical and mechanical systems that control irradiator source or shielding movement, the irradiator's shielding or sealed source, safety interlocks, or any component that may affect safe operation of the irradiator. These activities shall be performed by a person specifically licensed by the U.S. Nuclear Regulatory Commission or an Agreement State to perform such services.

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20. For each irradiator installed and used, the licensee shall:

A. Permit the use of the irradiator only when a calibrated and operable radiation survey meter or room monitor is available; and

B. Permit the irradiator door to be opened only after the operator has checked visual indicators to verify that the source has returned to its safe storage position; and

C. Have room monitors installed that will:

(i) Operate at all times when the irradiator is in use; and
(ii) Activate a visible and audible alarm when radiation exceeds 2 millirems per hour; and
(iii) Detect any radiation leaking from the irradiator door; and
(iv) Be visible to the irradiator user when the user is next to the irradiator; or

D. If a room monitor is not installed, have available a calibrated and operable survey meter which will be used to:

(i) Determine the radiation level at the irradiator door when the door is closed; and
(ii) Check for any increase in radiation levels each time the irradiator door is opened.

E. If abnormal radiation levels or any malfunctions of the irradiator are detected at any time, the licensee shall cease using the irradiator, restrict access to the area housing the irradiator, immediately notify the Radiation Safety Officer, and submit all reports required under 10 CFR Parts 20, 21 or 30.

F. Not repair or authorize repairs of the irradiator except by the manufacturer or other persons specifically authorized by the U.S. Nuclear Regulatory Commission or an Agreement State to perform such services.

21. The licensee is authorized to hold byproduct material with a physical half-life of less than or equal to 120 days for decay-in-storage before disposal without regard to its radioactivity if the licensee:

A. Monitors byproduct material at the surface before disposal and determines that its radioactivity cannot be distinguished from the background radiation level with an appropriate radiation detection survey meter set on its most sensitive scale and with no interposed shielding; and

B. Removes or obliterates all radiation labels, except for radiation labels on materials that are within containers and that will be managed as biomedical waste after they have been released from the licensee; and

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C. Maintains records of the disposal of licensed materials for 3 years. The record must include the date of disposal, the survey instrument used, the background radiation level, the radiation level measured at the surface of each waste container, and the name of the individual who performed the disposal.

22. The licensee shall possess and use byproduct material for human research in accordance with the prescriptive and performance criteria in all sections of 10 CFR Part 35 except sections 35.49(a) and (b), 35.100, 35.200, and 35.300.

23. Experimental animals, or the products from experimental animals, that have been administered licensed materials shall not be used for human consumption.

24. The licensee is authorized to transport licensed material in accordance with the provisions of 10 CFR Part 71, "Packaging and Transportation of Radioactive Material."

25. The licensee shall not acquire licensed material in a sealed source or device unless the source or device has been registered with the U.S. Nuclear Regulatory Commission pursuant to 10 CFR 32.210 or equivalent regulations of an Agreement State.

26. Radioactive waste generated shall be stored in accordance with the statements, representations, and procedures included with the waste storage plan described in the licensee's letter/application dated September 9, 1993 and October 29, 1993.

27. Notwithstanding the requirements of 10 CFR 35.315(a)(7), the licensee may control contamination in rooms used to house radiopharmaceutical therapy patients in accordance with the commitments and procedures contained in the letters dated April 8, 1992 and November 24, 1992.

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28. 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, except for minor changes in the medical use radiation safety procedures as provided in 10 CFR 35.31. The U.S. Nuclear Regulatory Commission's regulations shall govern unless the statements, representations, and procedures in the licensee's application and correspondence are more restrictive than the regulations.

A. Application dated January 21, 1993 (ML050680436)
B. Letter dated September 9, 1993 (ML050680406)
C. Letter dated October 29, 1993 (ML050680369)
D. Letter dated December 9, 1993 (ML050680355)
E. Letter dated February 15, 1994 (ML050680347)
F. Letter dated June 2, 1994 (ML050680339)
G. Letter dated December 6, 1996 (ML050680189)
H. Application dated October 15, 2001 (ML013020450)
I. Letter dated August 13, 2003 (ML032320387)
J. Letter dated October 29, 2004 w/Enclosures (ML043220447, ML043220460, ML043220467)

For the U.S. Nuclear Regulatory Commission

Date March 10, 2005

By ***Original signed by Ronald R. Bellamy***

Ronald R. Bellamy, Chief
Decommissioning Branch
Division of Nuclear Materials Safety
Region I
King of Prussia, Pennsylvania 19406

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
475 ALLENDALE ROAD
KING OF PRUSSIA, PENNSYLVANIA 19406-1415

April 24, 2005

Docket No. 03001317 License No. 08-01738-02
Control Nos. 135047
136837

Colonel Thomas M. Fitzpatrick, MC
Deputy Commander for Clinical Services
Department of the Army
Walter Reed Army Medical Center
6900 Georgia Avenue, NW
Washington, DC 20307-5001

SUBJECT: DEPARTMENT OF THE ARMY, WALTER REED ARMY MEDICAL CENTER, ISSUANCE OF LICENSE RENEWAL, CONTROL NO. 135047

Dear Colonel Fitzpatrick:

This refers to your request for renewal of your NRC license and to your amendment request dated April 15, 2005. Enclosed with this letter is the renewed license. As requested in your renewal application, the decommissioned U.S. Army Medical Laboratory facility at Fort Meade, Maryland has been removed from your license and may be released for unrestricted use. In addition, LTC Mark Melanson, Ph.D. is now designated as Radiation Safety Officer for this license.

Please review the enclosed document carefully and be sure that you understand all conditions. If there are any errors or questions, please notify the U.S. Nuclear Regulatory Commission, Region I Office, Licensing Assistance Team, (610) 337-5239, so that we can provide appropriate corrections and answers.

The NRC expects licensees to conduct their programs with meticulous attention to detail and high standards of compliance. Because of the serious consequences to employees and the public that can result from failure to comply with NRC requirements, you must conduct your program according to NRC regulations, the conditions of your NRC license, and the representations made in your application. Please note that the last condition on your license indicates that "This license condition applies only to those procedures that are required to be submitted in accordance with the regulations." Therefore, any procedures submitted that were not required by regulation to be submitted, e.g., calibration of dose calibrators, will not be considered a part of your license and were not reviewed during the licensing process. These procedures will be reviewed during inspections, as necessary.

Please note that you must:

1. Operate in accordance with NRC regulations 10 CFR Part 19, "Notices, Instructions and Reports to Workers; Inspections," 10 CFR Part 20, "Standards for Protection Against Radiation," and other applicable regulations.

Information in this record was deleted
in accordance with the Freedom of Information
Act, exemptions
FOIA 2006-0238
ML051160583

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2. Notify the NRC in writing when:

   a) the Radiation Safety Officer permanently discontinues performance of duties under the license or has a name change;

   b) the mailing address changes;

   c) the name on the license changes; or

   d) permitting an individual to function as a temporary Radiation Safety Officer in accordance with 10 CFR 35.24(c).

3. In accordance with 10 CFR 30.36(d), notify the NRC, promptly, in writing, and request termination of the license when you decide to terminate all activities involving materials authorized under the license.

4. Request and obtain a license Amendment before you:

   a) permanently change Radiation Safety Officers;

   b) receive byproduct material in excess of the amount, or radionuclide, or form different than authorized on the license;

   c) change the name or ownership of your organization;

   d) change the address(es) of use identified on the license;

   e) receive, prepare, or use byproduct material for a type of use that is not authorized on the license; or

   f) revise procedures required by 10 CFR 35.610, 35.642, 35.643, or 35.645, as applicable, where such revision reduces radiation safety.

5. Submit a complete renewal application or termination request at least 30 days before the expiration date of your license. You will receive a reminder notice approximately 90 days before the expiration date. Possession of byproduct material after your license expires is a violation of NRC regulations.

In addition, please note that NRC Form 313 requires the applicant, by signature, to verify that the applicant understands that all statements contained in the application are true and correct to the best of the applicant's knowledge. The signatory for the application should be the licensee or a certifying official of the licensee rather than a consultant.

You will be periodically inspected by the NRC. Failure to conduct your program in accordance with NRC regulations, license conditions, and representations made in your license application and supplemental correspondence with NRC will result in enforcement action against you. This could include issuance of a notice of violation, or imposition of a civil penalty, or an order

suspending, modifying or revoking your license as specified in NUREG 1600, "General Policy and Procedure for NRC Enforcement Actions" (Enforcement Policy).

An environmental assessment for this action is not required, since this action is categorically excluded under 10 CFR 51.22(c)(14).

Current NRC regulations and guidance are available at the NRC Web sites listed below or by contacting the Government Printing Office (GPO) toll-free at 1-888-293-6498. The GPO is open from 7:00 a.m. to 9:00 p.m. EST, Monday through Friday (except Federal holidays).

Thank you for your cooperation.

Sincerely,

Original signed by Sandra Gabriel

Sandra Gabriel
Senior Health Physicist
Medical Branch
Division of Nuclear Materials Safety

Enclosure:
Amendment No. 79

NRC Web site addresses
NRC regulations
http://www.nrc.gov/reading-rm/doc-collections/cfr/
Licensing guidance
http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1556/
General Policy and Procedure for NRC Enforcement Actions
http://www.nrc.gov/what-we-do/regulatory/enforcement/enforc-pol.pdf
206 of the Energy Reorganization Act of 1974
http://www.nrc.gov/who-we-are/governing-laws.html

cc:
LTC Mark Melanson, Ph.D., Radiation Safety Officer

DOCUMENT NAME: C:\ADAMS\Cache\ML0511603830.wpd

To receive a copy of this document, indicate in the box: "C" = Copy w/o attach/encl **"E"** = Copy w/ attach/encl **"N"** = No copy

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MATERIALS LICENSE

Pursuant to the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974 (Public Law 93-438), and Title 10, Code of Federal Regulations, Chapter I, Parts 30, 31, 32, 33, 34, 35, 36, 39, 40, and 70, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, possess, and transfer byproduct, source, and special nuclear material designated below; to use such material for the purpose(s) and at the place(s) designated below; to deliver or transfer such material to persons authorized to receive it in accordance with the regulations of the applicable Part(s). This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954, as amended, and is subject to all applicable rules, regulations, and orders of the Nuclear Regulatory Commission now or hereafter in effect and to any conditions specified below.

Licensee	In accordance with the application dated May 21, 2004 and the letter dated April 15, 2005,
1. Department of the Army Walter Reed Army Medical Center	3. License number 08-01738-02 is amended in its entirety to read as follows:
2. 6900 Georgia Avenue, NW Washington, D.C. 20307-5001	4. Expiration date April 30, 2015
	5. Docket No. 03001317 Reference No. 08-01738-03

6. Byproduct, source, and/or special nuclear material	7. Chemical and/or physical form	8. Maximum amount that licensee may possess at any one time under this license
A. Any byproduct material with atomic numbers 1 through 83	A. Any	A. 400 millicuries per radionuclide and 26 curies total
B. Hydrogen 3	B. Any	B. 2 curies
C. Phosphorus 32	C. Any	C. 1 curie
D. Strontium 90	D. Sealed Sources	D.
E. Molybdenum 99	E. Any	E. 23 curies
F. Technetium 99m	F. Any	F. 23 curies
G. Iodine 131	G. Any	G. 2 curies
H. Xenon 133	H. Any	H. 2 curies
I. Cesium 137	I. Sealed Sources	I.

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6. Byproduct, source, and/or special nuclear material	7. Chemical and/or physical form	8. Maximum amount that licensee may possess at any one time under this license
J. Gadolinium 153	J. Sealed Sources	J.
K. Iridium 192	K. Any	K.
L. Cesium 137	L. Sealed Sources	L.
M. Americium 241	M. Sealed Source	M.
N. Plutonium 239	N. Any	N. 0.01 millicuries
O. Americium 241	O. Any	O. 0.01 millicuries
P. Depleted Uranium	P. Metal	P. 400 kilograms
Q. Cesium 137	Q. Sealed Sources	Q. No single source to exceed the maximum activity specified in the certificate of registration issued by the U.S. Nuclear Regulatory Commission or an Agreement State
R. Cobalt 60	R. Sealed Sources	R. No single source to exceed the maximum activity specified in the certificate of registration issued by the U.S. Nuclear Regulatory Commission or an Agreement State

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9. Authorized use:

A. through K. Medical diagnosis, therapy and research in humans. Research and development as defined in 10 CFR 30.4, *including animal studies; instrument calibration; student instruction; and* in-vitro studies.

L. through O. Calibration and checking of the licensee's instruments. Teaching and training of students.

P. Shielding in linear accelerators.

Q. and R. **For irradiation of materials in self-shielded irradiator** devices that have been registered either with the U.S. Nuclear Regulatory Commission under 10 CFR 32.210 or with an Agreement State and which have been distributed in accordance with a Commission or Agreement State specific license authorizing distribution to persons specifically authorized by a Commission or Agreement State license to receive, possess, and use the devices.

CONDITIONS

10. Licensed material may be used or stored only at the licensee's facilities located at Walter Reed Army Medical Center (WRAMC), Washington, D.C.; WRAMC Forest Glen Section and Annex, Silver Spring, Maryland; Rickman Building, 13 Taft Court, Rockville, Maryland; and The Gillette Building, 1413 Research Boulevard, Rockville, Maryland.

11. A. The use of licensed material in or on humans shall be by an authorized user as defined in 10 CFR 35.2.

B. Individuals designated to work as authorized users, authorized nuclear pharmacists or authorized *medical physicists, as defined in 10 CFR 35.2, shall meet the training, experience, and recentness of* training criteria established in 10 CFR Part 35, and shall be designated, in writing, by the licensee's Radiation Safety Committee.

C. Licensed material in Items 6.A. through 6.P. for other than human use shall be used by, or under the supervision of, individuals designated by the Radiation Safety Committee.

D. Licensed material in Items 6.Q. and 6.R. shall be used by, or under the supervision of, individuals who have received the training described in the revised application appended to the letter dated January 10, 2005, and have been designated, in writing, by the Radiation Safety Officer. The licensee shall maintain records of individuals designated as users for 3 years following the last use of *licensed material by the individual.*

E. **The Radiation Safety Officer for this license is Lieutenant Colonel Mark Melanson, Ph.D.**

12. In addition to the possession limits in Item 8, the licensee shall further restrict the possession of licensed material at a single location to quantities below the limits specified in 10 CFR 30.72 which require consideration of the need for an emergency plan for responding to a release of licensed material.

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13. The licensee shall not use licensed material in field applications where it is released except as provided otherwise by specific condition of this license.

14. Experimental animals, or the products from experimental animals, that have been administered licensed materials shall not be used for human consumption.

15. Sealed sources or detector cells containing licensed material shall not be opened or sources removed from source holders by the licensee.

16. The licensee shall conduct a physical inventory every six months, or at other intervals approved by the U.S. Nuclear Regulatory Commission, to account for all sources and/or devices received and possessed under the license. Records of inventories shall be maintained for 5 years from the date of each inventory and shall include the radionuclides, quantities, manufacturer's name and model numbers, and the date of the inventory.

17. For sealed sources not associated with 10 CFR Part 35 use, the following conditions apply:

    A. Sealed sources shall be tested for leakage and/or contamination at intervals not to exceed six months or at the intervals specified in the certificate of registration issued by the U.S. Nuclear Regulatory Commission under 10 CFR 32.210 or under equivalent regulations of an Agreement State.

    B. Notwithstanding Paragraph A of this Condition, sealed sources designed to primarily emit alpha particles shall be tested for leakage and/or contamination at intervals not to exceed 3 months.

    C. Each sealed source fabricated by the licensee shall be inspected and tested for construction defects, leakage, and contamination prior to any use or transfer as a sealed source.

    D. In the absence of a certificate from a transferor indicating that a leak test has been made within the intervals specified in the certificate of registration issued by the U.S. Nuclear Regulatory Commission under 10 CFR 32.210 or under equivalent regulations of an Agreement State, prior to the transfer, a sealed source received from another person shall not be put into use until tested and the test results received.

    E. Sealed sources need not be tested if they contain only hydrogen-3; or they contain only a radioactive gas; or the half-life of the isotope is 30 days or less; or they contain not more than 100 microcuries of beta- and/or gamma-emitting material or not more than 10 microcuries of alpha-emitting material.

    F. Sealed sources need not be tested if they are in storage and are not being used; however, when they are removed from storage for use or transferred to another person and have not been tested within the required leak test interval, they shall be tested before use or transfer. No sealed source shall be stored for a period of more than 10 years without being tested for leakage and/or contamination.

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G. The leak test shall be capable of detecting the presence of 0.005 microcurie (185 becquerels) of radioactive material on the test sample. If the test reveals the presence of 0.005 microcurie (185 becquerels) or more of removable contamination, a report shall be filed with the U.S. Nuclear Regulatory Commission in accordance with 10 CFR 30.50(c)(2), and the source shall be removed immediately from service and decontaminated, repaired, or disposed of in accordance with Commission regulations.

H. Tests for leakage and/or contamination, including leak test sample collection and analysis, shall be performed by the licensee or by other persons specifically licensed by the U.S. Nuclear Regulatory Commission or an Agreement State to perform such services.

I. Records of leak test results shall be kept in units of microcuries and shall be maintained for 5 years.

18. Maintenance, repair, cleaning, replacement, and disposal of foils contained in detector cells shall be performed only by the device manufacturer or other persons specifically authorized by the U.S. Nuclear Regulatory Commission or an Agreement State to perform such services.

19. A. Detector cells containing a titanium tritide foil or a scandium tritide foil shall only be used in conjunction with a properly operating temperature control mechanism which prevents the foil temperatures from exceeding that specified in the certificate of registration referred to in 10 CFR 32.210.

B. When in use, detector cells containing a titanium tritide foil or a scandium tritide foil shall be vented to the outside.

20. The licensee shall not repair, remove, replace, or alter any of the following: electrical and mechanical systems that control source or shielding movement, the irradiator's shielding or sealed source, safety interlocks, or any component that may affect safe operation of the irradiator. These activities shall be performed by a person specifically licensed by the U.S. Nuclear Regulatory Commission or an Agreement State to perform such services.

21. For each cesium-137 irradiator installed and used, the licensee shall:

A. Permit the use of the irradiator only when a calibrated and operable radiation survey meter or room monitor is available; and

B. Permit the irradiator door to be opened only after the operator has checked visual indicators to verify that the source has returned to its safe storage position; and

C. Have room monitors installed that will:

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(i) Operate at all times when the irradiator is in use; and
(ii) Activate a visible and audible alarm when radiation exceeds 2 millirems per hour; and

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(iii) Detect any radiation leaking from the irradiator door; and
(iv) Be visible to the irradiator user when the user is next to the irradiator; or

D. If a room monitor is not installed, have available a calibrated and operable survey meter which will be used to:

(i) Determine the radiation level at the irradiator door when the door is closed; and
(ii) Check for any increase in radiation levels each time the irradiator door is opened.

E. If abnormal radiation levels or any malfunctions of the irradiator are detected at any time, the licensee shall cease using the irradiator, restrict access to the area housing the irradiator, immediately notify the Radiation Safety Officer, and submit all reports required under 10 CFR Parts 20, 21 or 30.

F. Not repair or authorize repairs of the irradiator except by the manufacturer or other persons specifically authorized by the U.S. Nuclear Regulatory Commission or an Agreement State to perform such services.

22. The procedures contained in the manufacturer's instruction manual for the irradiator authorized by this license, shall be followed, and a copy of this manual shall be made available to each person using or having responsibility for the use of the device.

23. The licensee is authorized to hold byproduct material with a physical half-life of less than or equal to 120 days for decay-in-storage before disposal without regard to its radioactivity if the licensee:

A. Monitors byproduct material at the surface before disposal and determines that its radioactivity cannot be distinguished from the background radiation level with an appropriate radiation detection survey meter set on its most sensitive scale and with no interposed shielding; and

B. Removes or obliterates all radiation labels, except for radiation labels on materials that are within containers and that will be managed as biomedical waste after they have been released from the licensee; and

C. Maintains records of the disposal of licensed materials for 3 years. The record must include the date of disposal, the survey instrument used, the background radiation level, the radiation level measured at the surface of each waste container, and the name of the individual who performed the disposal.

24. The licensee is authorized to transport licensed material in accordance with the provisions of 10 CFR Part 71, "Packaging and Transportation of Radioactive Material."

25. Notwithstanding the requirements of License Condition 26, the licensee is authorized to make program changes and changes to procedures specifically identified in the condition, which were previously approved by the U.S. Nuclear Regulatory Commission and incorporated into the license without prior Commission approval as long as:

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A. The proposed revision is documented, reviewed, and approved by the licensee's Radiation Safety Committee in accordance with established procedures prior to implementation.

B. The revised program is in accordance with regulatory requirements, will not change the license conditions, and will not decrease the effectiveness of the Radiation Safety Program.

C. The licensee's staff is trained in the revised procedures prior to implementation.

D. The licensee's audit program evaluates the effectiveness of the change and its implementation.

26. 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. This license condition applies only to those procedures that are required to be submitted in accordance with the regulations. Additionally, this license condition does not limit the licensee's ability to make changes to the radiation protection program as provided for in 10 CFR 35.26. The U.S. Nuclear Regulatory Commission's regulations shall govern unless the statements, representations, and procedures in the licensee's application and correspondence are more restrictive than the regulations.

A. Letter dated January 10, 2005, enclosing revision of application dated May 21, 2004 [ML050650027]
B. Letter dated March 28, 2005 [ML050930009]

For the U.S. Nuclear Regulatory Commission

Date April 24, 2005

By ***Original signed by Sandra Gabriel***

Sandra Gabriel
Medical Branch
Division of Nuclear Materials Safety
Region I
King of Prussia, Pennsylvania 19406

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APR 16 1969

Jack R. Roeder, Chief, Materials Inspection
& Enforcement Branch, CO:HQ

COMPLIANCE INVESTIGATION REPORT
DEPARTMENT OF THE ARMY
WALTER REED ARMY MEDICAL CENTER
WASHINGTON, D.C. 20012
LIC NO. 08-01738-02

Subject report is transmitted for your information. The investigation was conducted by Radiation Specialist Charles E. Coner, CO:I and its findings were discussed with Major General Phillip G. Mallory, Commanding General, Walter Reed Army Medical Center.

Although the available facts cannot substantiate a firm conclusion regarding the quantities of material ingested by the technician, it is our belief that he willfully took one oral dose of 25 microcuries of iodine-131, which resulted in a thyroid dose of 50 rads, and two oral doses, totalling not more than 10 millicuries of technicium-99m, from which he received a thyroid dose of 1 rad.

There are two aspects of this incident which, if only superficially considered, might seem to reflect discredit on the licensee's program. The first is concerned with the staff's failure to respond promptly and decisively at the first indication that the technician had received an internal exposure. In retrospect this is regretable, but considering the man's history of unusual behavior the licensee's response is more understandable than culpable. The second aspect relates to the wisdom of returning the technician to his job after he had displayed this unusual behavior. Obviously this was a bad judgement. When the staff concluded that he would inflict no harm on himself or others, they unfortunately defined "Harm" without consideration of the exposure limitations imposed by their license.

The licensee's remedial action and investigation was considered to be adequate.

Information in this record was deleted
in accordance with the Freedom of Information
Act, exemptions 6
FOIA- 2006-0238

Paul R. Nelson
Senior Radiation Specialist

CO:I:CEC

Enclosure:
~~Orig & 3 cys Rpt.~~
Portions Exc

OFFICE ▶	COMPLIANCE	PRN/sl	AER/sl			
SURNAME ▶	Coner:dmw cc	Nelson	Ryan			
DATE ▶	4/15/69					

Form AEC-318 (Rev. 9-53) U. S. GOVERNMENT PRINTING OFFICE 16—62761-3

COMPLIANCE INVESTIGATION REPORT

DIVISION OF COMPLIANCE

Region I

Subject: DEPARTMENT OF THE ARMY
WALTER REED ARMY MEDICAL CENTER
WASHINGTON, D.C. 20012
LICENSE NO. 08-01738-02

Internal Exposure - Radioisotope technician suspected of having willfully ingested as much as 10 millicuries of technicium-99m and 25 microcuries of iodine-131

Period of Investigation: March 24 - April 10, 1969
(March 24 - on site, April 9 and 10, telephone communications)

APR 16 1969

Investigator: _____
Charles E. Coner, Radiation Specialist Date

APR 16 1969

Reviewed by: _____
Paul R. Nelson, Senior Radiation Specialist Date

REASON FOR INVESTIGATION

Based on a telephone call from subject licensee on March 21, 1969, an investigation was conducted to determine the facts surrounding the finding that a technician showed a significant body deposition of byproduct materials.

SUMMARY

A technician claimed to have accidently injected approximately 2 millicuries of technicium-99m into his hand while administering a diagnostic dose to a patient. The following day he informed the Chief, Radioisotope Clinic, but did not follow the latter's suggestion that he be counted on the licensee's whole body counter. Two days later, at the close of the workday, he produced a scan, which he claimed was of his thyroid, showing an uptake of 2.5 microcuries of iodine-131. The following day the presence of both iodine-131 and technicium-99m in his body was confirmed by scans and whole body counting. A recount on the whole body counter, given on the next day, indicated that the technician had received an additional dose in the time interval between whole body counts. This additional dose could only have resulted from a willful intake by the technician. He was removed from his assignment in the radioisotope clinic and denied access. The licensee's investigation showed that he had, in fact, not received an accidental injection nor had his working conditions been such that there was any reasonable probability of there having been an inadvertent inhalation or ingestion of material. The technician's history of psychiatric disburbance, bioassay data, and statement of his fellow workers indicate that he probably took an oral dose of 25 microcuries of iodine-131 and not more than 10 millicuries of technicium-99m for a total thyroid dose of 51 rads. The licensee had conducted a full investigation of the circumstances relating to this matter. He is conducting daily urinalyses and weekly whole body counts of the technician. The technician has been removed from occupational exposure to ionizing radiation and his early discharge from the Army is being considered.

No items of noncompliance were noted in this investigation.

Persons Interviewed

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[redacted], Radioisotope Technician

Lieutenant Colonel, Gerald Johnston M.C., Chief, Nuclear Medicine Section

Major, William F. Kendall MSC, Health Physics Officer, WRAMC

Major, Horace B. Gardner M.C., Chief, Whole Body Counter Unit

Major General, Phillip G. Mallory M.C., Commanding General WRAMC

Exhibits

A. WRAMC Form 83

B. Health Physics Training Program

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DETAILS

Introduction

1. On March 21, 1969, Major William F. Kendall MSC, Health Physics Officer, Walter Reed Army Medical Center informed CO:I by telephone of the essential facts relating to the exposure of [redacted]. An investigation of the circumstances surrounding the exposure was deemed necessary to determine if there were inadequacies in the licensee's program which might have caused, or contributed to, the internal exposure of [redacted].

2. The last two inspections (1965 and 1966) of this license revealed no items of noncompliance.

Interview with [redacted]

3. [redacted] stated he was in the Radioisotope Clinic at 10:00 AM, Sunday, March 16, 1969, checking the performance of the counting equipment. He stated that he had turned off his counting equipment Saturday in anticipation of a scheduled power interruption. He stated that Dr. Johnston asked him to administer a 10 mCi intravenous dose of Tc-99m to a patient who was escorted to the Radioisotope Clinic by Dr. Fortner. [redacted] stated that the patient was semicomatose and moved his arm while [redacted] was attempting to make the injection. He stated that while he was restraining the patient he jabbed the needle into the palm of his left hand just below the thumb. He stated that his right hand pushed the plunger of the syringe and some of the syringe contents were injected into his hand. He estimated that the quantity of fluid injected was from 2 to 4 tenths of a milliliter. He showed the investigator his left hand. The investigator noted that there was a scratch on the left palm that was approximately 3/4" long, at the base of his thumb. The investigator informed [redacted] that the wound did not appear to be a puncture. [redacted] stated that the needle had scratched his palm and then made a penetration.

4. The investigator asked [redacted] if this had been the only instance in which he had received an internal exposure. [redacted] stated that it was the only time that he was aware of an internal exposure. He stated that he had administered a few diagnostic doses since the first of the month and these were recorded in the use log. He stated that in addition to those recorded in the log he had administered 3 doses of approximately 10 mCi of Tc-99m. He stated that the log would show that other technicians had administered the doses because he had offered to give the doses after the log entries had been made. (See also para 27).

5. The investigator asked [redacted] what action he had taken after he had accidently injected himself with the Tc-99m. He stated that he had not mentioned his accident to Dr. Fortner or to the intern who was assisting Dr. Fortner. He stated that at the time of the accident he had not been concerned but had recalled the event later in the day when the scratch was slightly irritating. He stated that he monitored the scratch with an end-window GM survey meter Monday morning and found no indication of contamination. He stated that he discussed his accident with the other technicians in the presence of Col. Johnston. He stated that Col. Johnston told him to report to the whole body counter if he was concerned about his exposure. He stated that he did not go to the whole body counter because he was quite busy.

6. [redacted] stated that on Tuesday he had an on-the-job trainee make a scan of his ([redacted]) thyroid. He stated that this scan showed the presence of I-131 in his thyroid. He stated that he showed this scan to Major Cottshall on the following day, Wednesday, and also told her of his accidental injection of Tc-99m which had occurred on Sunday.

7. The inspector asked [redacted] if he had handled any unsealed sources of I-131 within the previous two weeks. [redacted] stated that he had administered several diagnostic doses of less than 100 microcuries. The inspector asked him if there had been any unusual circumstances relating to these administrations or any other aspects of his work procedures that would account for his having taken up any I-131. [redacted] stated that his work habits had not changed and he had no idea of how he might have received this dose. The inspector asked [redacted] if it was possible that he had seen the Tc-99m rather than I-131 in the scan. [redacted] stated that the discriminator settings were such that the 140 kev of Tc-99m were blocked. The inspector asked [redacted] why he had not scanned for Tc-99m rather than for I-131. [redacted] stated that he had not thought of doing this.

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8. The inspector asked [redacted] if any other measurements had been made by the Isotope Clinic personnel or others. [redacted] stated that he had been scanned or counted by Capt. Gottshall, Col. Johnston and Maj. Gardner. The investigator asked [redacted] if he had ever taken or been given an internal dose of radioactive material. [redacted] stated that he had not. The investigator did not ask [redacted] about the finding these people because he had obtained the information from Col. Johnston and Maj. Gard

Interview with Col. Johnston

9. Col. Johnston stated that [redacted] had been assigned to the Radioisotope Clinic in the Fall of 1966. He stated that [redacted] had been well trained before he arrived at the Clinic. He stated that [redacted] had also received approximately 12 hours training from the Walter Reed Army Medical Center Health Physics Officer during his early days of assignment. Johnston stated that [redacted] had been an excellent worker in every respect.

10. Johnston stated that an incident had occurred during the middle of January which he believed had some relevance to [redacted] experience that was now being investigated. He stated that the Military Police had telephoned him at his home one Saturday afternoon to tell him that [redacted] had been stabbed while preventing the theft of a television from Col. Johnston's office. He stated that he had gone to the hospital to see how seriously [redacted] had been wounded. He stated that [redacted] told him a rather exciting story of his struggle with two men, showed him blood spots on the floor and displayed a superficial wound on his abdomen. Johnston said that [redacted] recounted the story during the week and enjoyed the admiration of his fellow employees. However, Johnston stated, several weeks later he (Johnston) was informed by the Military Police that there had in fact been no attempted burglary. Johnston stated that the Military Police had confronted [redacted] with conclusive evidence that it was not possible for a burglar to have entered the Clinic and [redacted] had confessed that he had fabricated the story and had inflicted the wound himself. Johnston stated that [redacted] had told the Military Police that a scalpel which he had used for the self inflicted wound could be found in the back of a drawer in Col. Johnston's desk. Col. Johnston stated that on hearing this information he opened his desk drawer and found a scalpel stained with dried blood. Johnston stated that he then conferred with Major T. R. Robertson MC, a psychiatrist, and Robertson suggested that [redacted] be admitted for observation. Johnston stated that, several days later, Robertson informed him that [redacted] had a [redacted] with a [redacted]. Johnston stated that Robertson said that such a person did not have [redacted] He said that [redacted] superficial wound was true to type.

[redacted] Johnston stated that Robertson recommended that [redacted] be allowed to resume his work since Robertson believed that [redacted] would outgrow or suppress this character disorder through continued contact with the psychiatry staff.

11. With regard to the present incident, Johnston stated that he had overheard [redacted], on Monday, March 17, 1967, talking to the other technicians about his accidental injection. Johnston stated that he looked at the scratch on [redacted] hand and asked him if he had monitored the hand. He stated that [redacted] had stated that he had monitored his hand and found nothing but was concerned about the possiblity that the Tc-99m was distributed in his body. Johnston stated that he told [redacted] to go to the whole body counter if he was worried.

12. Johnston stated that he did not hear any more concerning the matter until Wednesday March 19, 1969 at about 4:30 PM. He stated that Capt. Elizabeth Gottshall MSC, his physicist, informed him that [redacted] had shown her a scan which [redacted] had stated had been made at his thyroid. Johnston stated that he and Gottshall were more annoyed than concerned because they thought [redacted] was again attempting to attract attention. Johnston stated that at that time, he suspected that the scan produced by [redacted] had been taken from a patient's record. However, he stated later when the presence of I-131 in [redacted] thyroid was confirmed he believed that [redacted] scan was probably authentic. But even as he doubted its authenticity he and Gottshall decided that a kidney and thyroid scan should be done the next morning.

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13. Johnston stated that Gottshall reported to him, at approximately 9:00 AM on Thursday March 20, 1969, that a kidney scan had shown no mercury or technicium' but that a thyroid scan had shown approximately 1 microcurie of Tc-99m and 1.5 microcuris of I-131. Col. Johnston stated that he immediately telephoned Major Gardner and arranged for a whole body count at 3:00 PM. He stated that Gardner informed him on Thursday afternoon that he had found approximately 5 microcuries of I-131 and from 50 to 200 microcuries of Tc-99m in [redacted] body. He could only make a gross estimate of the quantities because the whole body counter was calibrated for submicrocuris quantities only. Johnston stated that, later, Gardner obtained a calibration by counting patients who had recently been given diagnostic quantities of I-131 and Tc-99m.

14. Johnston stated that he then informed Major Kendall, the Health Physics Officer and Maj. Gen. P. G. Mallory, the Chairman, Radioisotope Committee, of the facts relating to the incident. He stated that Gen. Mallory ordered a meeting of the Radioisotope Committee for the earliest date on which Johnston thought an interim report could be prepared. Johnston stated that he conferred with Gardner and later informed Gen. Mallory that he suggested that the Committee meet on March 26, 1969.

15. Johnston stated that at that time he and Gottshall realized the bioassay value that might be derived from the thyroid scan that [redacted] claimed to have made on Wednesday. He stated that he asked Specialist Kubicki, the man who [redacted] had said assisted him in making the scan, if the scan produced by [redacted] was actually a scan of [redacted] thyroid. Johnston stated that Kubicki (an on-the-job trainee) could not identify the scan as being [redacted] but he did say that [redacted] had coached him and he (Kubicki) had made a scan of [redacted] thyroid on Tuesday.

16. Johnston stated that, in view of Gottshall's failure to see Tc-99m on the kidney scan made on Thursday morning, he decided that another scan should be made on Friday morning. He stated that he too failed to see Tc-99m in the kidney but confirmed Gottshall's scan showing "a bolus of material" in the lower colon. He stated that the bolus had descended since Thursday. He stated that Major Gardner also made another whole body count on Friday morning, March 21, 1969. He stated that Maj. Gardner found that the activity in [redacted] body was still too high to permit accurate assay. Johnston stated that Gardner made the rather startling discovery that the apparent half life of the Tc-99m in [redacted] body was 46 hours. Johnston stated that such a finding could only result from [redacted] having had an intake of Tc-99m since his last whole body count (the previous day). Johnston stated that [redacted] had had no official reason for handling Tc-99m in the 24 hour interim, so he concluded that [redacted] had willfully taken a dose of Tc-99m sometime between Thursday afternoon March 20 and Friday morning, March 21, 1969. He stated that he took [redacted] keys to the Radioisotope Clinic away from him and told him not to enter the Clinic unless he was in Col. Johnston's physical presence.

17. Johnston stated that he administered a dose of Lugol's solution to [redacted] Friday morning, March 21, 1969, in the hope of inhibiting uptake of both the I-131 and the Tc-99m.

18. In answer to the investigators question as to Johnston's opinion of the significance of the foregoing facts Johnston made these points:

a. He had no reason to believe that [redacted] did not sustain an internal exposure to Tc-99m as a result of his puncture wound (However see para 19).

b. It was impossible for [redacted] to have received (accidently or willfully) such a quantity of Tc-99m on Sunday, March 16, 1969 that the residual found on Thursday March 20, 1969 could be as great as 50 microcuries. This would have required a dose in excess of 100 millicuries, an inventory loss that would have been immediately evident on Monday morning.

c. Since [redacted] apparently did not want to have a whole body count on Monday afternoon he probably had taken neither I-131 nor Tc-99m on until at least Monday, after duty hours.

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d. Since [redacted] on Wednesday, showed Gottshall a scan, which he claimed was of his thyroid, it is probable that [redacted] took a 25 microcurie oral dose of I-131 approximately 24 hours prior to the scan. The 25 microcurie dose was the usual diagnostic dose, and the 24 hour delay between dose and scan was the standard procedure at the Clinic.

e. In anticipation of the Thursday morning examination, of which [redacted] had been apprised, he probably took a Tc-99m dose of less than 1 millicurie.

f. He must have taken at least 500 microcuries and no more than 1 mCi of Tc-99m on Thursday evening since his Tc-99m burden on Friday was only slightly less than had been found on Thursday afternoon (Physical half life of Tc-99m is 6 hours).

Johnston stated that these estimates seemed reasonable to him and consistant with the measurements that had been made. However, he stated, it was also possible that [redacted] took larger quantities and/or more frequent doses earlier in the week.

19. On April 7, 1967, the investigator asked Col. Johnston if the bioassay findings made subsequent to March 24, 1969 had permitted any refinement of his estimates. Johnston said that the findings confirmed their original estimations. He stated that he had learned at the Radioisotope Committee meeting that Dr. Fortner had been observing his patient very closely on Sunday March 16, 1969 when [redacted] administered the 10 mCi Tc-99m dose. He stated that Fortner's patient had come from the intensive care unit with plasma being transfused intravenously. He stated that Fortner and an intern watched closely as [redacted] made the injection, not into the patient's arm as he had stated, but into the intravenous tube. He stated that Fortner told the Chairman of the Radioisotope Committee that both he and the intern were certain that [redacted] had not injected himself accidently or willfully while their patient was in the Clinic.

Interview with Maj. Kendall

20. Kendall gave the investigator a copy of an equivalent Form AEC-4 for [redacted]. This copy is enclosed as Exhibit A. Kendall stated that [redacted] attended a course of instruction that was identical to the course shown as Exhibit B. The investigator inspected [redacted] DD Form 1141 and noted that his total external whole body exposure since arrival at Walter Reed Army Medical Center has been 559 millirems and his total extremity exposure has been 1.9 rems. Kendall stated that [redacted] was given a whole body count on February 20, 1969 and no unnatural activity was found in his body. Kendall stated that personnel assigned to the Radioisotope Clinic are not routinely subject to periodic bioassay. However, he stated that all personnel handling unsealed material are given a whole body count to provide a background for comparison purposes. He stated that [redacted] whole body count was delayed because the whole body counter was being rebuilt when [redacted] started his occupational exposure.

21. Kendall showed the investigator the records of surveys made by the health physics technician Sgt 1st Class Hugh B. O'Niel. The investigator noted that surveys were recorded monthly and occasionally at more frequent intervals. He noted that generally 10 swipes were taken in the preparation room and they showed removable activity of less than 100 dpm/100 cm^2. He noted that 5 swipes were made on March 19, 1969 and 35 on March 21, 1969. He noted that these swipes showed negligible removable activity. Kendall stated that all swipes were evaluated at the Health Physics Office on a windowless flow counter that had been calibrated against a C-14 standard. The investigator noted that the survey reports also showed that external exposure rates were less than 5mr/hr, normal refuse containers had been checked and no radioactive material had been found, absorbent paper was on hand and being used, plastic gloves were available for use and the general housekeeping was adequate. Kendall stated that he checked the flow rate of the fume hood on March 21, 1969, and found that it was 100 linear feet per minute with the hood door opened to 20". He stated that each hood at the center is checked each 6 months with a velometer by his technicians.

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22. Kendall stated that he first heard of [redacted] exposure on Thursday afternoon March 20, 1969. He stated that he collected a urine sample from [redacted] on March 21, 1969 and that an analysis of thaurine showed that it contained I-131 and Tc-99m. He stated that the only fecal sample was collected on March 24, 1969 and this too showed I-131 and a trace of Tc-99m. He stated that daily urine samples will be collected until the activity has decreased to an undetectable level. He stated that whole body counting will be done weekly for as long as this test is profitable.

23. With regard to an estimate of when [redacted] took the material, how much he took, and how often, Kendall stated that he did not expect to obtain more than a rough estimate unless [redacted] revealed the facts. He stated that their ability to extrapolate back to obtain quantity and time estimates is complicated by many factors including, the possibility that he may have taken multiple doses, the short half life of Tc-99m, the sequence in which the materials may have been taken, and the effectiveness of the Lugol solution in blocking the thyroid. However, he stated, there were some guidelines that could be used. He stated that, based on the psychiatrist's evaluation, one could assume that [redacted] would have taken only quantities that he believed would not hurt him and that he took these quantities at such times as would serve his purpose of attracting attention (i.e. prior to times when he or others would measure the activity in his body).

24. Kendall stated that, following this rationale, both he and Johnston believed that [redacted] would not have taken more than 10 millicuries of Tc-99m. He stated that this was the quantity of Tc-99m normaly used for diagnostic purposes in the Clinic. He also stated that, had [redacted] taken more than 10 millicuries the loss might well have been evident from inventory. With regard to the probable date of intake of Tc-99m, Kendall stated that [redacted] purpose would not have been served by taking the dose prior to Sunday, March 16, 1969, since he did not mention his intake until Monday afternoon. However, Kendall stated he did not believe that [redacted] did take the Tc-99m on Sunday since he was unwilling to go to the whole body counter on Monday afternoon as Col. Johnston had suggested. Kendall stated that he believed that [redacted] is most likely to have taken his first dose of Tc-99m on Tuesday afternoon or Wednesday morning because it was not until Wednesday afternoon that he resumed his discussion about his concern about a Tc-99m burden. Kendall stated that [redacted] bluff had been called" on Monday afternoon when Johnston had suggested that he get a whole body count. But on Wednesday afternoon when he showed the I-131 scan to Cottshall and also expressed concern about a possible burden of Tc-99m, Kendall stated, he probably anticipated a whole body count and scan by taking a dose of Tc-99m.

25. Kendall stated that a dose of 10 millicuries of Tc-99m taken during that period (Tuesday afternoon to Wednesday morning) would be consistent with the scans made Thursday morning and the whole body count made later in the morning. To account for the apparent half life of 46 hours between the Thursday and Friday whole body counts, Kendall stated, it must be assumed that [redacted] took an additional small dose of Tc-99m. He stated that the Friday whole body count indicated that the additional dose could not have been greater than 1mCi. He stated that the probable time of intake was between 5 and 10 PM, since his whereabouts was unaccounted for during this interval.

26. Kendall stated that he and Johnston had concluded that the most probable intake of I-131 was 25 microcuries (a usual diagnostic dose) and the most likely time of intake was Monday evening, March 17, 1969. Kendall stated that [redacted] thyroid scan made on Tuesday and the Thursday and Friday whole body counts give good assurance that [redacted] did not take any additional doses of I-131.

27. On April 7, 1969, Kendall informed the investigator by telephone that he had questioned the Radioisotope Clinic personnel concerning [redacted] claim that he had administered three 10 mCi Tc-99m doses during the week of 16 to 22 March 1969. Kendall stated that each Tc-99m entry in the use log was discussed with the technician whose name was shown as the responsible technician. He stated that each technician denied that the dose shown on the log had been administered by any person other than himself or herself.

Interview with Maj. Gardner

28. Major Gardner confirmed the information previously reported in the investigator's interviews. He informed the investigator that he had known [redacted] for the past two years. He stated that [redacted] had expressed an interest in transferring from the Radioisotope Clinic to the Whole Body Counting Unit in the Fall of 1968. He stated that he would have been pleased if the transfer could have been made because he was favorably impressed with [redacted] intelligence and [redacted] and he would not have taken quantities of radioactive material that he considered to be harmful.

29. On April 7, 1969, Gardner informed the investigator, by telephone, that subsequent to the investigator's on-site discussion he (Gardner) had counted several patients who had received intravenous doses of Tc-99m. He stated that he noted that [redacted] had shown a significantly greater quantity of Tc-99m in the gut than had his other patients. He stated that this confirmed his belief that [redacted] had taken the Tc-99m orally.

Probable Dose to [redacted]

30. The investigator noted that the greatest quantity of I-131 considered by the licensee, to have been ingested was 25 microcuries and the greatest quantity of Tc-99m to have been 10 millicuries. The investigator noted that this quantity of I-131 would deliver a thyroid dose of 50 rads and the Tc-99m would deliver 1 rad; as reported by Andros, Harper, et al. "Pertechnetate-99m Localization in Man with Applications to Thyroid Scanning and the Study of Thyroid Physiology" Journal of Clinical Endocrinology and Metabolism, Volume 25, No. 8, August 1965.

Management Discussion

31. On April 10, 1969, the investigator discussed the findings of the investigation by telephone with General Mallory. The investigator stated that no items of noncompliance had been found in the course of the investigation. General Mallory stated that after the incident he and the members of the Radioisotope Committee had agreed that the decision to return [redacted] to his job at the Clinic after he had demonstrated abnormal behavior had not been wise. He stated that in the future, should a similar circumstance arise, they will act more conservatively.

EXHIBIT B

60-09(3a)67

HP FILE COPY

DISPOSITION FORM

(AR 340-15)

REFERENCE OR OFFICE SYMBOL	SUBJECT
MEDEC-RS	Health Physics Aspects of Radioisotope Use

TO

FROM Health Physics Officer

DATE 27 Dec 67

CMT 1

MAJ Kendall/jab/5104

1. A course of instruction on the "Health Physics Aspects of Radioisotope Use" will be conducted for personnel of this command as shown below.

DATE	TIME	PLACE	SUBJECT	INSTRUCTOR
14 Dec 67	1400-1600	Rm 341 WRAIR	Introductory Remarks Control of Radioisotopes Terminology & Physics Review	MAJ Kendall
22 Dec 67	1000-1200	Rm 341 WRAIR	Mathematics Review Nuclear Instrumentation Personnel Monitoring	SP6 Huber SFC Carney
27 Dec 67	1000-1200	Rm 341 WRAIR	Principles & Practices of External Radiation Protection Principles & Practices of Internal Radiation Protection	SFC O'Neil MAJ Kendall
3 Jan 68	1600-1730	Rm 120 WRAIR	Safe Handling Practices for Radioisotopes	SP6 Caulk SP6 Collins SP4 Delnick
9 Jan 68	1400-1630	Rm 341 WRAIR	Biological Effects of Radiation Limits of Exposure Summary Quiz	MAJ Minx
11 Jan 67	1500-1600	Rm 341 WRAIR	Role of Health Physics at WRAMC Local Policies Award of Army Certificates of Training	MAJ Minx

2. Please not that the classes scheduled for 22 and 27 December fall during the Holiday Work Schedule period. It is requested that each course participant schedule his absences to enable him to attend the sch-duled instruction.

3. Personnel desiring to attend the scheduled course should complete the attached registration form and return it to Health Physics promptly.

FOR THE HEALTH PHYSICS OFFICER:

William F Kendall

WILLIAM F. KENDALL
MAJ, MSC
AHPO, WRAMC

1 Incl
as

DA FORM 2496 REPLACES DD FORM 96, EXISTING SUPPLIES OF WHICH WILL BE USED UNTIL SYSTEM IS IMPLEMENTED

APR 30 1969

Files

COMPLIANCE INVESTIGATION REPORT FOR
DEPARTMENT OF THE ARMY
WALTER REED ARMY MEDICAL CENTER
WASHINGTON, D. C. 20012
LICENSE NO. 8-1738-2

INVESTIGATION CONDUCTED MARCH 24 - APRIL 10, 1969

RE: INTERNAL EXPOSURE - TECHNICIAN SUSPECTED OF HAVING WILLFULLY INGESTED AS MUCH AS 10 MILLICURIES OF TECHNETIUM-99m and 25 MICROCURIES OF IODINE-131

The subject report has been reviewed. This is to confirm that we do not plan to correspond with Walter Reed Army Medical Center concerning the investigation as no enforcement action appears appropriate. No items of noncompliance or safety items were noted during the investigation. We consider the case closed.

Original Signed by
T. W. Brockett

T. W. Brockett
Materials Inspection and
Enforcement Branch
Division of Compliance

cc: CO:I
Helen Semmes

Information in this record was deleted in accordance with the Freedom of Information Act, exemptions 6
FOIA- 2006-0238

Portions Ex 6

MAY 2 1969

OFFICE ▶	CO	CO				
SURNAME ▶	TWBrockett:akb	JRRoeder				
DATE ▶	4/29/69					

Form AEC-318 (Rev. 9-53) AECM 0240

U.S. GOVERNMENT PRINTING OFFICE : 1968 O—296-617

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UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

JUN 5 1969

Files

DEPARTMENT OF THE ARMY, WALTER REED ARMY MEDICAL CENTER, WASHINGTON, D. C., LICENSE NO. 8-1738-2

On March 21, 1969, Region I was informed by the subject licensee that a technician had apparently ingested some radioactive material. On March 24, 1969, Region I conducted an investigation. It was concluded that the technician apparently self-administered microcurie quantities of iodine 131 and millicurie quantities of technetium 99. The investigation revealed that the technician has a past history of a self-inflicted wound and of mental instability. There were no items of noncompliance and the case was closed by memo to files dated April 30, 1969.

As a result of an investigation conducted by Walter Reed Hospital, the hospital also concluded that the technician deliberately ingested the radioactive material. Walter Reed sent in a comprehensive report dated May 12, 1969, of the results of its investigation to the AEC. The report contains a great deal of medical information concerning the technician and alludes to his past behavioral abnormalities. After review of the report, we have decided not to place a copy in the Public Document Room at this time. Although the name of the technician would be deleted, we believe no useful purpose would be served by placing the report in the PDR.

Original signed by:
Jack R. Roeder

Jack R. Roeder, Chief
Materials Inspection &
Enforcement Branch
Division of Compliance

cc: CO:I ✓
DML:IB, w/cpy ltr dtd 5/12/69
w/encl.
Helen Semmes

JUN 9 1969

DEPARTMENT OF THE ARMY
WALTER REED ARMY MEDICAL CENTER
WASHINGTON, D.C. 20012

IN REPLY REFER TO
MEDEC-RS

MAY 1 1969

SUBJECT: Report of Overexposure

THRU: The Surgeon General
ATTN: MEDPS-PO
Department of The Army
Washington, D.C. 20315

TO: Director
Division of Licensing and Regulation
U.S. Atomic Energy Commission
Washington, D.C. 20545

1. Forwarded, herewith, incompliance with 10 CFR Part 20.405(a) are six (6) copies of each of the following documents relating to an investigation into the facts surrounding an internal exposure to radioisotopes incurred by a radioisotope technician assigned to Walter Reed General Hospital in March 1969.

a. Report of Investigation, Radioisotope Technician, WRGH (Incl 1)

b. Minutes of a Special Radioisotope Committee Meeting, convened on 14 April 1969 to consider the facts surrounding the subject exposure. (Incl 2)

c. Letter, MEDEC-RS, Subject: Notification of Technical Overexposure, addressed to the subject individual. (Incl 3)

d. Identification Data as required by 10 CFR Part 20.403(c). (Incl 4)

2. Request that all questions and/or comments pertaining to this matter be referred to the Health Physics Officer, Bldg 188, Forest Glen Section, Walter Reed Army Medical Center, Washington, D.C. 20012 (Telephone: IDS Code 198 - 5161 or Commercial Area Code 202 - 576-5161).

FOR THE COMMANDER:

R. NYSTROM, Jr.
LTC, MSC
Adjutant

4 Incl
as

MAY 5 1969

APR 17 1969

REPORT OF INVESTIGATION
RADIOISOTOPE TECHNICIAN
WALTER REED GENERAL HOSPITAL

1. The following report is a summary of the findings of an investigation into the facts and circumstances surrounding the uptake of radioactive material by an enlisted Radioisotope Technician assigned to the Nuclear Medicine Section, Radiology Service, Walter Reed General Hospital during the month of March 1969.

2. Background Information: The individual enlisted in the US Army on 30 Jul 1966 for a three (3) year term and was assigned to WRAMC on 17 Oct 1966 following basic training. Since he had been trained as a radioisotope technician at the University of Michigan Medical Center, Ann Arbor, Michigan prior to enlisting; he was assigned to the Nuclear Medicine Section, WRGH. His performance of duty and technical knowledge were exemplary. On 1 Feb 1969, the individual sustained lacerations of his abdomen and face in the Radioisotope Clinic. Although he initially alleged that the injury resulted from an assault on him as he was attempting to prevent two individuals from stealing a government owned television set; the incident was shown to be a hoax, the laceration proved to be self-induced, and ultimately he admitted the facts and circumstances. No sutures were required but as a result of this incident the individual was hospitalized for psychiatric evaluation from 5-10 Feb 69. There was no evidence of psychosis and the diagnosis was one of a Character-Behavior Disorder. The diagnosis made by the psychiatrist who evaluated him was:

"Situational Maladjustment, acute, moderate, manifested by suicidal gesture. Stress: Routine Military Duty. Predisposiiton: Moderate Schizoid Personality Traits. Impairment for further military service. None."

Since 17 Feb 69 he has been followed as an outpatient in Group Therapy. According to his psychiatrist, there is no evidence of a thinking disorder, but he does live out a glorious fantasy.

3. Summary of Current Incident:

a. On Sunday, 16 March 1969, at about 1000-1030 hours, the individual performed a brain scan using Technetium-99m on a semi-comatose patient. The individual claims that during the injection the patient moved in such a way that his (the subject technician) left hand was scratched and punctured by the hypodermic needle. According to the technician 0.2-0.4 ml (0.94-1.88 mCi) of Technetium-99m were injected into his hand and that his hand bled a few drops after the needle was withdrawn. He returned to the laboratory a few feet away, washed his hands thoroughly, applied a band aid, changed the needle, and returned to complete the procedure. CPT Robert W. Fortner, MC, witnessed the injection of the radioactive material and states that the injection was made without incident and that the above sequence of events did not take place.

b. According to the technician, he handled 50 uCi of Iodine-131 in a 2.5 ml syringe - 1-1/2 inch needle combination on Saturday, 15 Mar 69 and Sunday, 16 March 1969 which he used for instrument calibration. He states that the material was withdrawn from a stock solution prepared for diagnostic administration the following week and returned to the stock solution following use. The procedure was conducted in the radiological fume hood which was apparently operating normally at the time. Surveys of the air flow show no significant changes from 28 June 1967 to 21 March 1969. A power outage was scheduled for 15 March 1969 and certain of the sensitive nuclear counting equipment was turned off on Friday, 14 March 69 to prevent damage in the event of a power surge. The technician states that the hood was off but the lights were on when he was working with the isotopes. However, LTC Gerald S. Johnston, MC, Chief, Nuclear Medicine Section, WRGH, is confident that the hood was left running. Since the lights had to be on for there to have been enough light in the room to work, it must be assumed that the hood was operating. The technician also states that the window of the hood was fully open, but that he never inserted his head (breathing zone) into the hood. Although this cannot be refuted, the laboratory has an exceptional record for keeping the window in the proper position to block the breathing zone of the workers. Such a window position is inconsistent with day-to-day observation in this laboratory. The technician also states that to the best of his knowledge no accident occurred during the handling of these isotopes. This is corroborated by the findings of the radiological protection survey conducted on 21 March 1969.

c. On Monday, 17 March 69, the technician showed a band aid covering a small scratch on his left hand to other technicians and stated that he had been injured during the brain scan on Sunday (See para 3a, above). About 1430 hours, an On-the-Job Trainee Radioisotope Technician who was being trained by the subject individual, assisted him in the use of the 2x2 Sodium Iodide scintillation thyroid probe to evaluate himself. Although the record of these findings has disappeared, it is generally agreed that the highest count rate was in the region of the bladder, the next highest in the region of the thyroid, and a count rate significantly higher than background all over the viscera. In the absence of actual data, no calculations can be made; however, this would be consistent with an uptake of Iodine-131 and/or Technetium-99m no earlier than Sunday, 16 Mar 69 and later than the morning of Monday, 17 Mar 69. The individual discussed the findings with LTC Johnston who sent him to the Whole Body Counter. If the uptake had occurred as alleged by the individual the quantity injected (0.94-1.88 mCi) would have resulted in an uptake in the thyroid of 282-564 uCi (assuming a normal thyroid) which would have decayed by physical half-life to 8.8-17.6 mCi by the time of the discussion. The individual did not report to the Whole Body Counter.

d. On Tuesday, 18 March 1969, the individual went into the laboratory at the Radioisotope Clinic and, in the presence of a group of technicians, surveyed himself with a portable survey instrument (Eberline Model E-120 with HP210 Probe). He obtained a reading over his sternum which he said was 10 mR/hour. SP4 Kubecki confirms the meter reading but could not

see the scale setting on the instrument. The ambient gamma background in that location was measured on 24 March 1969 and found to be 1 mR/hour.

e. Also on Tuesday, 18 March 1969, the individual led his assistant, SP4 Kubicki through a scan of his thyroid with the Picker Magnascanner V using a window setting of 314-414 KeV (Iodine-131). The maximum meter reading on the ratemeter of the Magnascanner was 15,000 cpm at some point over the thyroid. The window setting is reasonably certain and, if correct, would confirm the presence of Iodine-131 at that time since Technetium-99m would not give a significant count rate in that window. Following this procedure, evaluations were conducted on the individual's thyroid using the thyroid probe and various settings. The OJT technician performed the evaluation. The records of these procedures have also vanished, however, LTC Johnston believes that approximately 2.5 mCi of Iodine-131 would have had to have been in the thyroid at that time to give the results obtained, assuming the Iodine-131 window was used. LTC Johnston again sent the individual to the Whole Body Counter, but again he did not go.

f. At some time on Tuesday, 18 Mar 69, the individual saw Major Horace B. Gardner, MC who is the responsible officer for the Whole Body Counter and happened to be in the Radioisotope Clinic on another matter. The subject technician commented to the effect that he bet he would light up Dr. Gardner's machine now. Other comments were made which alluded to his body burden, but the incident is meaningful only in retrospect since Dr. Gardner was unaware of the overall situation and therefore attached no significance to the conversation.

g. Late in the afternoon of Wednesday, 19 March 69, CPT Elizabeth Gotshall, MSC, who supervises the technicians in the Radioisotope Clinic, first learned of the Sunday incident and discussed the matter with LTC Johnston. Considering the magnitude of the initial exposure (according to the individual's statements) and the time interval involved, no action was indicated. Approximately 15 half-lives had elapsed and thus only 0.003% of any Technetium-99m absorbed on Sunday, 16 March 1969 would have remained at that time.

h. On Thursday, 20 March 1969, SP6 Troy R. Blanton, WRAMC, Health Physics, was surveying some technicians in the Radioisotope Clinic for contamination. When the subject technician was checked, a generalized reading above background was found and a hot spot of 3 mR/hr (with a portable survey meter, Eberline Model E-120 with HP 190 end window probe) in the upper right abdomen. Under questioning by SP6 Blanton, the technician related the alleged incident on 16 March 1969. SP6 Blanton advised SFC Hugh B O'Neil, his immediate supervisor, of the incident about noon. SFC O'Neil planned a follow-up visit to the Radioisotope Clinic for later in the day but did not immediatey respond because of (1) the time which had elapsed since the incident and (2) previous experience with similar injuries.

i. At about 1300 hours, Thursday, 20 March 1969 CPT Elizabeth Gotshall, MSC performed several evaluations on the subject technician.

(1) Using Picker Dynapix, a kidney scan using settings for Technetium-99m and Mercury. The scan was negative; i.e. no scan was obtained and thus it may be concluded that no significant quantities of these isotopes were located in the lower abdomen at that time.

(2) Using the thyroid probe, the following data was obtained:

Window	Counts/Minute	Location
60-140 KeV (Tc-99m)	25,602	Anterior upper Rt. Quadrant
	12,102	Posterior upper Lt. Quadrant
	32,965	Posterior upper Rt. Quadrant
	4,442	Thyroid
314-414 KeV (Iodine-131)	6,689	Thyroid

The following statements can be made with respect to the above findings:

(a) Radioactive material was located in the upper right quadrant of the abdomen.

(b) The Thyroid contained 1.46 uCi of Iodine-131 and 1.61 uCi of Technetium-99m at the time of evaluation.

(3) Since the observations were completely inconsistent with the alleged incident on Sunday, 16 March 69, LTC Johnston had CPT Gotshall make an appointment for the individual at the Whole Body Counter. LTC Johnston notified Health Physics (SFC O'Neil) that an uptake of unknown origin had taken place and that the individual was to be at the Whole Body Counter at 1500 hours.

j. At about 1600 hours, Thursday, 20 March 1969, SFC O'Neil went to the Whole Body Counter and discussed the findings with MAJ Gardner. The individual had to be counted one crystal at a time, and even so the activity was too great to be handled by the instrument. Although resolution is not very good under 140 KeV, a great number of counts were found in this region (later found to be Technetium-99m). In the region of the thyroid, a large number of low energy counts and a clear Iodine-131 spectrum were obtained. SFC O'Neil then went to the Radioisotope Clinic and continued his investigation until all personnel had left for the day.

k. According to the subject technician, he returned to the Radioisotope Clinic at about 1800 hours, Thursday, 20 March 69, and performed a kidney scan on himself using the Phogamma. A 50,000 count scan was taken using Technetium-99m window settings and a scan of one "kidney" was obtained.

MEDEC-RS
SUBJECT: Report of Investigation

1. On Friday, 21 March 1969, the following occurred:

(1) At about 0800, LTC Johnston was given the "kidney" scan by the individual and at about 0830 he notified SFC O' Neil of the scan.

(2) At 0832 the undersigned was notified of the incident and, after making several telephone calls to verify details as they were known at that time, notified COL Andrew J. Colyer, MSC, Executive Officer, WRAMC at 0912 hours.

(3) At 0940 the undersigned arrived at the Radioisotope Clinic and initiated this investigation. A one (1) hour conference was held with LTC Johnston. Notification of the incident had been made by LTC Johnston to Chief, Radiology Service; Executive Officer, WRGH; and Chief, Department of Psychiatry and Neurology, WRGH.

(4) LTC Johnston rescanned the "kidney" using the Phogamma. With settings for Mercury-197 no scan was obtained; however, Technetium-99m settings produced a good scan of a single area below the kidney area. The evaluation of the "hot spot" in the upper right abdomen found by SP6 Blanton and CPT Gotshall early Thursday afternoon; the "kidney" scan taken by the subject individual on Thursday evening; and the scan taken by LTC Johnston on Friday morning are consistent with a mass of radioactive material (largely Technetium-99m) moving through the large intestine. This is corroborated by independent findings on the whole body counter and evaluation of a stool sample on Monday, 24 March 69.

(5) LTC Johnston reevaluated the individual using the Thyroid Probe and found 1 uCi of Iodine-131 and 1.2 uCi of Technetium-99m in his thyroid. A significant count rate of Technetium-99m was also found in the region of the liver and bladder. No quantification can be made of the latter data by this method.

(6) At about 1000 hours, the individual was again counted by MAJ Gardner in the Whole Body Counter. The following observations are made from the results of this evaluation:

(a) The thyroid still contained Iodine-131 and Technetium-99m

(b) The bolus in the gut had moved (Previously observed by LTC Johnston via kidney scans)

(c) The Technetium-99m in the upper part of the body had essentially tripled since 1500 hours the previous day.

(d) There had NOT been a significant decay of the Technetium-99m in the bolus in the gut even though 3 physical half-lives had elapsed and the residual activity should have been only 1/8th of the activity found

at the earlier counting. It should be noted that the whole body counter is not designed for specific localization and therefore some contribution would result from other areas where Technetium-99m had localized, including the bladder and the region of the liver.

(e) The above observations can only be explained by an additional uptake of Technetium-99m after 1600 hours, 20 March 1969. The finding of additional hot spots in the regions of the bladder and transverse colon support this hypothesis and indicate an ingestion which must have taken place before 2400 hours, 20 March 1969.

(7) At 1100 hours, LTC Johnston relieved the individual of his keys to the Radioisotope Clinic and subsequently of duty at the Radioisotope Clinic.

(8) At 1130 hours a urine sample was obtained from the individual for radiological assay by Health Physics. The urine contained Iodine-131 (0.054 uCi per liter ± 3.16 % @ 95% CL) and Technetium-99m (0.941 uCi per liter ±0.41% @ 95% CL). No other isotopes were found.

(9) At 1130 hours, the undersigned discussed with MG P.W. Mallory the findings, required reporting, and the scheduling of a special meeting of the Radioisotope Committee.

(10) At 1230 hours, the undersigned made the initial telephonic reports to OTSG and then to Region I, US Atomic Energy Commission (Mr. Gilbert).

(11) At 1400 hours, Mr. Nelson, Region I, US Atomic Energy Commission called the undersigned and discussed the incident.

(12) At 1550 hours, Mr. Charles Coner, Region I, US Atomic Energy Commission called the undersigned to advise that he would be at Walter Reed Army Medical Center on Monday, 24 March 1969 to conduct an investigation.

(13) During the afternoon, coordination was made with the following:

(a) MAJ Theodore R. Robertson, MC, Psychiatrist seeing the subject individual.

(b) MAJ Horace B. Gardner, MC, Whole Body Counter

(c) LTC Ray D. Beesley, JAG, Center Judge Advocate

(d) LTC Albert J. Luban, MSC, Troop Commander

(14) In the late afternoon, the individual was interviewed by MAJ Robertson who evaluated his mental attitudes at that time.

(15) In late afternoon, LTC Johnston administered Lugols Solution to himto accelerate clearance of the Iodine-131 and Technetium-99m from his body. Subsequent quantitative determinations are therefore biased by this necessary action and cannot be related to the original uptake.

(16) The individual was instructed to bring a stool sample to Radiology Service for pick-up on Saturday, 22 March 1969 by Health Physics for radiological assay. No sample was provided and, although the individual denied having had a bowel movement over the weekend, only one radioactive bolus remained in the large intestine on Monday, 24 March 69. This strongly indicates that the individual did have a bowel movement and failed to provide a sample as directed.

(17) A complete radiological protection survey was conducted during the afternoon by Health Physics and the results of that survey failed to reveal any evidence of an accident which could have accounted for his uptake.

m. On Monday, 24 March 1969, Mr. Charles Coner, USAEC conducted an investigation from 0900-1530 hours. He reviewed the available data, interviewed several persons, and agreed with our findings and conclusions at that time.

n. Since by 1530 hours, Monday, 24 March 1969 the individual claimed not to have had a bowel movement, LTC Johnston arranged for an enema to be performed to remove the radioactive material from the lower intestine. This reduced his exposure and provided a sample for radiological evaluation by Health Physics. The results of that evaluation at 1630, 24 March 1969 were:

Iodine-131	89.2 pCi gram ±3.9% @ 95% CL
Technetium-99m	28.7 pCi/gram ±4.9% @ 95% CL

o. The investigation and evaluations continued through Monday, 24 March 1969 and Tuesday, 25 March 1969. At 1600 hours, 25 March 1969 an interview was held with the individual by the undersigned and CPT Donald E. Stahl, MSC Assistant Health Physics Officer, WRAMC. The interview was relaxed and cordial. He talked freely and cooperated completely. The pertinent facts brought forth by him have been integrated into the report at their appropriate location. The individual tried to tell us everything and did not appear to be holding back, but he was unable to remember the details of events he could recall and omitted several events completely. He was unable to relate the events to their day or hour of occurrences with any effectiveness. He stated that recently he has had a lot of trouble remembering things. When questioned about recent

events, he in fact was unable to recall details or events. He frequently alluded to his devotion to duty of which he seemed quite proud. He seemed quite impressionable and care had to be taken not to introduce ideas because he would later "recall" them when the discussion returned to that item. This individual definitely stated that he did not remember ever drinking any radioisotopes and that he did not know of any accidents, other than the events on Sunday, 16 March 1969, which could have accounted for his uptake of radioactive material. Both statements seemed very carefully worded and not as spontaneous as his other comments. As possible explanations to the body burden, several areas were explained.

(1) The individual does not drink hard liquor, but does frequently drink beer at the bowling alley. He does not drink to drunkenness, but does recall a few headaches in the mornings over the previous 2 weeks. His drinking habits are corroborated by others who frequent the bowling alley.

(2) The individual does not use drugs and all who know him, including Dr. Robertson, his psychiatrist, feel that this is not consistent with his behavioral pattern.

(3) The medications he takes include: librium, tetralac, bismuth subcarbonate, ornade, darvon, and an antihistamine (pink and white capsule). He stated that he takes librium for stomach pains and a hernia. He does not know of any occasion when he may have taken librium and then drunk alcoholic beverages, but he could not be certain due to his difficulty remembering events and details. The opinion of the interviewing officers was the he was cooperative and truthful. We do not feel that he was consciously concealing facts. Numerous attempts were made to trap him into contradicting himself and he was consistent in each case. He was not allowed to present a rehearsed story, but was kept off balance by questions, returning to earlier statements, etc. We accept that the story as related by him is what he honestly believes happened, even though it is refuted by physical evidence and the statement of others.

p. On Wednesday, 26 March 1969, a special meeting of the WRAMC Radioisotope Committee was convened to consider this incident. The minutes of that meeting are contained in a separate document.

q. Additional evaluations are continuing on this individual including:

(1) A daily urinalysis for radioisotopes

(2) A weekly whole body count

(3) Continuing Group Therapy

(4) A Line of Duty Investigation

(5) A CBC with platelets

(6) At separation a physical examination to include:

(a) Whole Body Count

(b) CBC with platelets

(c) T-3 Test

(d) PBI Test

4. Analysis of Current Incident

a. There is no evidence to support accidental uptake or injection of radioactive material by the individual.

b. The findings on Monday, 17 March 1969, are consistent with an uptake of radioactive material by the individual between Sunday, 16 March 1969 and the morning of Monday, 17 March 1969. The most likely mode of entry was ingestion. No qualitative or quantitative statements may be made concerning these findings except that (1) from the localization of the material, the isotope(s) would be Iodine-131 and/or Technetium-99m and (2) from the counting rate observed, the quantity was in the diagnostic range for thyroid studies.

c. The findings on Tuesday, 18 March 1969, indicate approximately 2.5 uCi of Iodine-131 in the thyroid (assuming the Iodine-131 window was used for counting and the calculations were done correctly). No isotopic identification was attempted at this time.

d. Radioactive material, principally Technetium-99m, was found in the colon of the individual in the morning of Thursday, 20 March 1969 and traced to the sigmoid colon by the morning of Friday, 21 March 1969. Six independent measurements were made. The occurrences of Technetium-99m in the gut in any significant quantity can only be accounted for by ingestion of the radioisotopes. No estimate of the time of ingestion can be made due to the irregular eating and bowel habits of the individual, coupled with his use of antiacid compounds. A second area in the colon was found on Friday, 21 March 1969. A stool sample was obtained on Monday, 24 March 1969, Technetium-99m and Iodine-131 were found indicating ingestion of both isotopes.

e. Multiple ingestions of the isotope(s) is supported by (1) the occurrence of a second area in the colon on 21 March 1969, (2) the failure of the Technetium-99m to decay from 20 March - 21 March by a factor of 8 in accordance

with the physical half-life, (3) the change in the distribution of the isotope on Friday, 21 March 1969, (4) the fact that back calculation of the quantity of Technetium-99m which would have to have been ingested on Sunday, 16 Mar 69 to account for the findings on Thursday, 20 Mar 69 would have resulted in serious radiation damage to the thyroid, would have exceeded the Technetium-99m available at that time, and would have created a radioactivity level in the individual which would have interferred with his scanning patients early in the week.

f. It is the opinion of the physicians that he would not have subjected himself to any risk of significant radiation damage. This would be inconsistent with his personality and with the previous episode in which he was involved. Since he is quite knowledgeable in the use of radioisotopes in medicine, it is felt that many small ingestions to gain attention without significant risk are much more likely.

g. Dose calculations are impossible in this case since there were multiple ingestions of multiple isotopes occurring at unknown times. There were at least three separate ingestions and probably more (Sunday, 16 Mar, Monday, 17 Mar before 0800; (2) Evening of Wednesday, 19 Mar; and (3) Evening of Thursday, 20 Mar).

h. It is generally agreed that the maximum quantities which were ingested did not exceed 20 uCi of Iodine-131 and 10 mCi of Technetium-99m; however, this cannot be irrefutably supported by physical evidence.

i. It is interesting that he was instructed to report to the Whole Body Counter on three occasions before he actually reported to evaluation (17 Mar, 18 Mar, and 20 Mar 69). There is no acceptable reason given for this and the individual had no reason to fear the procedure since he had been counted on 20 Feb 69.

j. The following determinations were made from data obtained in the Radioisotope Clinic using the thyroid probe. This instrument has about 3% efficiency for Iodine-131 and substantially less for Technetium-99m. The error evaluation on the instrument indicates that the percent uptake (i.e. count from patient divided by count from standard taken over a like time period) is only accurate to ±3%. Considering the wide normal variation in the thyroid function this is quite adequate for diagnostic determination; but not for quantitative measurements of thyroid burden. The inconsistency of this data is adequately explained by this uncertainty.

Date and Time	Iodine-131 (uCi)	Technetium-99m (uCi)
18 Mar 69 (1400-1430)	2.5 uCi	
20 Mar 69 (1400)	1.46 uCi	1.61 uCi
21 Mar 69 (0900)	1 uCi	1.2 uCi

k. The results of a special radiation protection survey are included in Annex A to this report. They show that there is no evidence to indicate any accident of sufficient magnitude to account for the uptake in the work area.

l. The analysis of the results of the evaluations at the WRAIR Whole Body Counter are included in Annex B. Since this instrument is designed for quantitative determination of low levels of internally deposited radioisotopes, the body burden as determined by this method is the most reliable estimate available.

m. The results of the CBC with platelets performed on the individual on 3 Apr 69 is included as Annex C. LTC Ray A. Olsson, MC, a hematologist, evaluated the results and found all values within normal limits.

n. The results of laboratory evaluations performed by Health Physics as bioassays of feces and urine from the individual are included as Annex D.

5. The above report is complete and correct to the best of my knowledge and belief.

William F. Kendall

WILLIAM F. KENDALL
MAJ, MSC
Health Physics Officer

ANNEX A to
Report of Investigation, Radioisotope Technician, WRGH

REFERENCE OR OFFICE SYMBOL	SUBJECT
MEDEC-RS	Surveys of Radioisotope Clinic on 21 March 1969

TO	FROM	DATE	CMT 1
HPO, WRAMC	C, R&S Br, HP, WRAMC	16 Apr 69	

1. On 21 March 1969 by direction of the Health Physics Officer a Special Survey of the Radioisotope Clinic in Room 1, Bldg G-19, Walter Reed Army Medical Center was conducted by SP6 Troy R. Blanton, Health Physics, WRAMC.

2. The results were as follows:

a. Thirty-five wipes were taken in the areas noted on attached drawings.

b. All of the 35 wipes except one were less than 100 dpm/100 cm . One was 117.7 dpm/100 cm this wipe was taken from the radioactive disposal sink in the clinic.

c. A ten minute count was taken of the above wipes and a Gamma Spectrum analysis was done on all thirty-five wipes together. No identification of specific isotope(s) could be made.

d. A survey of the lab for contamination and gamma fields with an E-120 with HP 210 probe revealed nothing extraordinary.

e. From the information in and above it is concluded that there was no contamination in the either the laboratory or clinic that would indicate an accident.

f. Surveys taken on 19 March 69, 25 Feb 69 and 14 Jan 69 reveal substantially the same findings, i.e. contamination.

g. The survey included the usual canvas of personnel in the Isotope Clinic to determine any unusual procedures, incidents or unusual conditons existing. Nothing extraordinary was found.

3. In addition to the above, the chemical fume hood in the laboratory was also checked and found to be operating properly. The flow rate was checked with Alnor Velometer #27650. The flow rate was slightly higher than previously measured. The hood was remarked to reflect the current flow rate.

4. The technician's whole Body film badge (#574 "1" period) was removed by SP6 Blanton on the 21st of March and Badge #933 "1"period was issued to him. Badge #574 "1" period was forwarded to Lexington Blue Grass Army Depot for evaluation. On Wednesday 26 March telephone reply from Lexington revealed (The report from Lexington is attached).

5. Analysis of this information which is consistent with the usual findings in this area indicated that no significant spills or aerosolization of radioactive material occurred and that good routine cleanliness was in evidence. No unusual hazards existed in this area at the time of survey.

Donald E Stahl
DONALD E. STAHL
CPT, MSC
C, R&S Br, HP, WRAMC

ANNEX B to
Report of Investigation, Radioisotope Technician, WRGH

REFERENCE OR OFFICE SYMBOL: MEDEC-ZJB

SUBJECT: Estimation of Isotopic Contamination in a Radioisotope Technician

THRU Dir, Div of Nuclear Med
WRAIR

FROM: Major H. Gardner
Whole Body Counting Fac.
Div of Nuclear Med.

DATE: 10 April 1969

CMT 1

TO Major W. Kendall
Health Physics Officer
WRAMC

1. Assessment of isotopic contamination in an Isotope Technician ____. was carried out at the Whole Body Counting Facility, Division of Nuclear Medicine, on 20 February, 20, 21, 24, 26 March, 1 and 9 April 1969. The first of these counts was done as a routine check, and CPT Elizabeth Gotshall was counted on the same date. The other counts were requested by the clinic and Health Physics due to suspected contamination. Complete gamma ray spectrums were recorded on 20 February and 20 and 21 March for isotope identification. Only quantitative studies were done subsequently with a visual check of the spectrum for possible new contamination. Several patients from the Nuclear Medicine Section (Isotope Clinic) receiving known amounts of isotopes, as well as several small (geometrically) sources of known activity, were also counted in an attempt to quantitate the contamination.

2. The Whole Body Counter is a sensitive instrument designed to measure gamma emitters present in the body in nanocurie amounts. Above 500 nanocuries (0.5 microcurie) the results are non-linear functions of the amount present and require approximations of some uncertainty. A crude estimation of isotope localization is also possible.

3. The findings of the above indicate no detectable contamination of the above subject as of 20 February 1969 after many months of lab work handling isotopes. On Thursday 20 March it was evident that microcurie levels of isotopes were present. ^{131}I was definitely present, as well as a low energy gamma emitter suspected and later shown to be ^{99m}Tc. Gross localization showed the ^{131}I to be in the thyroid area; the ^{99m}Tc was predominantly in the RUQ of the abdomen. Estimation of ^{131}I in the thyroid yielded 1.4 microcuries (about 5 microcuries total body). The estimation for ^{99m}Tc is somewhat less reliable, but was in the 50-200 microcurie range. On Friday 21 March the ^{131}I est. and localization remained approximately the same (1.2 microcuries). The ^{99m}Tc would be expected to have decreased 8 fold (18 hrs. later, half-life of 6.04 hrs.) but had remained essentially unchanged (increased, if anything). More activity was now present in the thorax, while the abdominal activity was more midline and somewhat lower. By the following week, the ^{99m}Tc had disappeared, and the ^{131}I was decreasing as would be anticipated from its effective half-life. No additional isotopes have been noted.

4. Conclusion: It is the opinion of this investigator that the subject has been exposed to multiple isotopes (at least ^{99m}Tc and ^{131}I) on multiple occasions (at least one dose of ^{99m}Tc prior to Thursday 20 March, and one between the Thursday and Friday counts). These were probably in the diagnostic range, and 16 microcuries of ^{131}I in the thyroid on 21 February would represent an absolute maximum for I contamination. Since no time of ingestion of the Tc is available, back calculation is impossible. However, diagnostic levels are suspected due to availability and the probable use of a 1-2 millicurie dose the night of Thursday 20 March.

MEDEC-ZJB 10 April 1969
SUBJECT: Estimation of Isotopic Contamination in a Radioisotope Technician

5. Further evaluation: Since on 9 April 1969 it was estimated 0.24 microcuries of ^{131}I was all that remained in the thyroid, whereas the Report of Committee II on Permissible Dose for Internal Radiation (1959) recommends a thyroid content of no more than 0.3 microcurie, further follow-up will be done only per your request.

H. B. GARDNER
MAJ, MC
Whole Body Counting Facility

ANNEX C to
Report of Investigation, Radioisotope Technician, WRGH

COULTER COUNTER® "MODEL S" COULTER ELECTRONICS INC. HIALEAH, FLA.

Radioisotope Technician
Isotope Clinic, WRGH
Dr. Johnston — Radioisotope Clinic

DATE DAY MONTH YEAR
4 0 3

CLINIC NO. 109 — REMARKS: [illegible]

CHGS FILED ☐ Hgb ☐ Hct ☐ WBC ☐ OR in AM ☐ EMERGENCY

0 7 9	TEST	NORMALS MALE	NORMALS FEMALE
0 6. 6 IF 99.9 RE-DILUTE	WBC X 10^3	4.8-10.8	4.8-10.8
5 . 2 2	RBC X 10^6	4.6-6.2	4.2-5.4
1 6. 0	Hgb gm	14-18	12-16
4 7. 6	Hct %	42-52	37-47
0 9 2.	MCV μ^3	82-92	82-92
2 9. 5	MCH $\mu\mu g$	27-31	27-31
3 2. 4	MCHC %	32-36	32-36

☒ DIFFERENTIAL

67	POLY.
	STAB.
27	LYMPH.
5	MONO.
1	EOS.
	BASO.
	BLAST CELLS
	MYELOCYTES
	METAMYELOCYTES
	NRBC/ 100 WBC
	ANISOCYTOSIS
1+	POIKILOCYTOSIS

CHARGE: DATE: REPORT BY: NURSE:

NOTES:

Adequate	☒ PLATELET
1	☐ RETIC
	☐ LEE WHITE
	☐ SED. RATE

D2.4

HEADQUARTERS
WALTER REED ARMY MEDICAL CENTER
Washington, D. C. 20012

14 April 1969

SPECIAL RADIOISOTOPE COMMITTEE MEETING

1. A special meeting of the Radioisotope Committee, as appointed by WRAMC Special Order 204, 17 September 1965, was held in Room 108A Walter Reed Army Institute of Research at 0930 hours, 26 March 1969.

a. The following members were present:

Colonel Nelson R. Blemly, MC, Assist Chief, Radiology Service, WRGH (Representing Colonel Longstreet Hamilton, MC, Chief, Radiology Service) Acting Chairman
Colonel John G. Maier, MC, Chief, Radiation Therapy, WRGH, Member
Colonel Michael A. Sulak, MC, Chief, Pathology Service, WRGH, Member
LTC Ray D. Beesley, JAG, Center Judge Advocate, non-voting member
LTC Gerald S. Johnston, MC, Chief, Radioisotope Clinic, WRGH, Member
LTC Charles E. Miller, MSC (Representing Colonel Philip L. LaManch, MSC, Director of Logistics Division, WRAMC) non-voting member
LTC Robert K. Modlin, MC, Chief, General Medicine Service, WRGH (Representing Colonel Robert H. Moser, MC Chief, Department of Medicine, WRGH) Member
LTC Ray A. Olsson, MC (Representing Colonel Marcel E. Conrad, MC Chief Department of Hematology, Division of Medicine, WRAIR)
Major William F. Kendall, MSC, Health Physics Officer, WRAMC Member
Major Charles M. Pyfer, MC, Radiologist USAMU, Ft. Detrick, Maryland Member
Captain Fredrick P. Siegal, MC (Representing Colonel Harold E. Ratcliffe, MC Preventive Medicine Officer) Member
Captain Donald E. Stahl, MSC Assistant Health Physics Officer, WRAMC, Recorder
Mr. Billy Bass, Civ, Chief, Department of Nucleonics, Division of Nuclear Medicine, WRAIR, Member

b. The following members were absent:

MG Philip W. Mallory, MC, Commanding General, WRAMC, Chairman
Colonel John L. Bradley, MC, Chief, Professional Services, WRGH Vice-Chairman
LTC David M. Ginsberg, MSC, Chief, Department of Biophysics, Division of Nuclear Medicine, WRAIR, Member
LTC Merrill C. Johnson, MC, Chief, Department of Radiation Biology, Division of Nuclear Medicine, WRAIR, Member
LTC Dorsey T. Mahin, MC, Director, Division of Nuclear Medicine, WRAIR, Member

c. The following were invited guests:

Major Horace B. Gardner, MC, Whole Body Counting Facility, WRAIR
Major Donald Powell, MSC, Troop Command, WRAMC
Major Theodore R. Robertson, Chief Resident, Psychiatry Service, WRGH

2. The meeting was called to order by Colonel Blemly, Assistant Chief, Department of Radiology, Acting Chairman, at 0935 hours.

3. Since this was a special meeting of the Radioisotope Committee no old business was discussed.

4. Major Kendall opened by stating that the purpose of the Special Radioisotope Committee meeting was to investigate the circumstances of an alleged overexposure of a technician working in the Radioisotope Clinic, WRGH. Major Kendall presented a lengthy report of the investigation conducted. The report dealt in detail with an alleged injury during a brain scan, the refutation of this injury by witnesses, the past history of the individual, the many evaluations of his bocy burden in the radioisotope clinic and at the Whole Body Counter, the evaluations made of the work area, the statements of the technician's associates, and many other matters. A transcript of this meeting is available.

5. LTC Johnston expanded on MAJ Kendall's report and discussed the technician's previous behavior in some detail. LTC Johnston estimated that the amount of 131-Iodine involved was less than 25 microcuries and speculated that the entire incident was another attempt by the technician to draw attention to himself. LTC Johnston also commented on his exceptional competence as a radioisotope technician.

6. MAJ Gardner related his role in evaluating the technician in the Whole Body Counter. The technician had been counted on 20 Feb 69 and no body burden was found which differed from the population at large. Although the instrument is designed to measure 0.5 microcuries or less, studies performed with clinically dosed patients subsequent to the incident indicate that the technician had a body burden of 50-200 microcuries of 99m-Technetium on Thursday, 20 Mar 69 and the same or a little more on Friday, 21 Mar 69. The absence of radioactive decay, as well as the distribution of the isotope in the body, indicate that a subsequent ingestion occurred between the evaluations. Subsequent evaluation have been consistent with normal physical and biological processes. MAJ Gardner identified 99m-Technetium and 131-Iodine in the technician's thyroid.

7. MAJ Robertson discussed the psychiatric status of the technician. He has a diagnosis of situational maladjustment with a predisposing schizoid personality. This is a character-behavior disorder and leads to acting things out rather than engaging in verval communication with others. He does have some capacity to adjust and is included in the Group Therapy Program. He is not psychotic and does not have a thinking disorder.

He was seen again on Friday, 21 Mar 69 when the investigation began and was not psychotic and had not had a dissociative reaction at that time.

8. An extensive discussion of the matter was held by the committee which probed every point and opinion rendered.

9. The conclusions of the Committee were:

a. Multiple isotopes are involved - specifically 131-Iodine and 99m-Technetium.

b. Multiple exposures took place, including some radioactive material that was present on Tuesday, probably 131-Iodine, and 99m-Technetium. From the findings at the Whole Body Counter, a possible additional ingestion on Wednesday evening and another on Thursday is suspected. The total number of ingestions and the times at which they occurred are based on the best possible evaluation of the available data and do not rule out other ingestions.

c. It is believed that all of the exposures were within or below the diagnostic range.

d. Evidence indicates that there was not enough radioactive material ingested to do clinical damage to the technician.

e. Based on the findings of the investigation it is inconceivable that the incident was the result of an accident.

f. The incident was the result of actions performed by an individual with a character-behavior disorder.

g. Further pursuit of the investigation will not reveal substantially any more related facts than are now available.

h. Additional facts bearing on the matter which are uncovered as a result of other investigations (e.g. Line-of-Duty, etc) will be pursued.

i. Dose calculations should not be made unless greater confidence can be attained in the quantities ingested and the times of uptake.

10. The following recommendations were proposed by the Committee.

a. That the individual be routinely followed until such time as he returns to normal or instrumental background levels of activity as determined at the Whole Body Counter.

b. That he be again counted on the Whole Body Counter at the termination of his term of active duty.

c. That he receive a CBC with platelet count at this time and at his termination of active duty.

d. That a T-3 and/or PBI Test be accomplished at the time of his separation from active duty.

e. That no punitive action be recommended.

f. That he be considered for administrative separation under AR 635-212.

g. That a Line of Duty Investigation be accomplished on the individual.

h. That the individual not be assigned to any duties which place him near any significant occupational hazards.

i. That he be assigned where he can be closely supervised.

II. There being no further business the meeting was adjourned by Colonel Blemley at 1110 hours.

Nelson R. Blemly
NELSON R. BLEMLY
COL, MSC
Acting Chairman

Donald E Stahl
DONALD E. STAHL
CPT, MSC
Recorder

Approved.

Philip W. Mallory
PHILIP W. MALLORY
Major General, MC
Commanding

DEPARTMENT OF THE ARMY
WALTER REED ARMY MEDICAL CENTER
WASHINGTON, D.C. 20012

IN REPLY REFER TO
MEDEC-RS

MAY 1 1969

SUBJECT: Notification of Technical Overexposure

THRU: Commanding General
Walter Reed General Hospital
ATTN: Chief, Radiology Service
Washington, D.C. 20012

TO: [redacted] Ex 6
Enlisted Company
Walter Reed General Hospital
Washington, D.C. 20012

1. This report is furnished to you under the provisions of the Atomic Energy Commission regulations entitled "Standards for Protection Against Radiation" (10 CFR Part 20). You should preserve this report for future reference.

2. On 20 March 1969, Health Physics discovered during a routine survey in the WRGH Radioisotope Clinic that you had incurred an internal exposure to radioisotopes, specifically Technetium-99m and Iodine-131.

3. A subsequent investigation revealed that there were one or more ingestions, apparently self inflicted, and that they began on or about Sunday, 16 March 1969.

4. Owing to reluctance or inability on your part to recall all of the facts surrounding this incident it has not been possible to estimate your total uptake or internal exposure.

5. A special meeting of the WRAMC Radioisotope Committee was convened on 14 April 1969 to consider this matter and reached the following conclusions:

MAY 1 1969

MEDEC-RS
SUBJECT: Notification of Technical Overexposure

a. That all of the exposures were within or below the diagnostic range.

b. That there was not enough radioactive material ingested to do clinical damage to you.

c. That it was inconceivable that this incident was the result of an accident.

d. That dose calculations should not be attempted unless greater confidence can be attained in the quantities ingested and the times and dates uptake occurred.

5. This Committee recommended that no punitive action be taken against you, that you not be assigned to duties which place you near any significant occupational hazards, and that you be assigned to duties where you can be closely supervised.

FOR THE COMMANDER:

R. NYSTROM, Jr.
LTC, MSC
Adjutant

DEPARTMENT OF THE ARMY
WALTER REED ARMY MEDICAL CENTER
WASHINGTON, D.C. 20012

IN REPLY REFER TO
MEDEC-RS

MAY 1 1969

IDENTIFICATION DATA

Reference is made to Report of Overexposure of a Radioisotope Technician assigned to Walter Reed General Hospital, during March 1969.

The following information is furnished in compliance with 10 CFR Part 20.403(c).

Ex. 6

a. Name:
b. Social Security Account Number:
c. Date of Birth:
d. Status: Radioisotope Technician, Radioisotope Clinic, Walter Reed General Hospital, Washington, D.C. 20012

William F. Kendall
WILLIAM F. KENDALL
MAJ, MSC
Health Physics Officer
WRAMC

Form AEC-591
(7/67)

NITED STATES ATOMIC ENERGY COMMI ON
DIVISION OF COMPLIANCE

INSPECTION FINDINGS AND LICENSEE ACKNOWLEDGMENT

GCIII

1. LICENSEE	2. REGIONAL OFFICE
Department of the Army Walter Reed Army Medical Center Washington, D.C. 20012	U. S. ATOMIC ENERGY COMMISSION Division of Compliance, Region I 970 Broad Street Newark, N.J. 07102
3. LICENSE NUMBER(S) 8-1738-2	4. DATE OF INSPECTION reinsp June 23, 1969

5. INSPECTION FINDINGS

- [x] A. No item of noncompliance was found.
- [ ] B. Rooms or areas were not properly posted to indicate the presence of a RADIATION AREA. 10 CFR 20.203(b) or 34.42
- [ ] C. Rooms or areas were not properly posted to indicate the presence of a HIGH RADIATION AREA. 10 CFR 20.203(c) (1) or 34.42
- [ ] D. Rooms or areas were not properly posted to indicate the presence of an AIRBORNE RADIOACTIVITY AREA. 10 CFR 20.203(d)
- [ ] E. Rooms or areas were not properly posted to indicate the presence of RADIOACTIVE MATERIAL. 10 CFR 20.203(e)
- [ ] F. Containers were not properly labeled to indicate the presence of RADIOACTIVE MATERIAL. 10 CFR 20.203(f) (1) or (f) (2)
- [ ] G. A current copy of 10 CFR 20, a copy of the license, or a copy of the operating procedures was not properly posted or made available. 10 CFR 20.206(b)
- [ ] H. Form AEC-3 was not properly posted. 10 CFR 20.206(c)
- [ ] I. Records of the radiation exposure of individuals were not properly maintained. 10 CFR 20.401(a) or 34.33(b)
- [ ] J. Records of surveys or disposals were not properly maintained. 10 CFR 20.401(b) or 34.43(d)
- [ ] K. Records of receipt, transfer, disposal, export or inventory of licensed material were not properly maintained. 10 CFR 30.51, 40.61 or 70.51
- [ ] L. Records of leak tests were not maintained as prescribed in your license, or 10 CFR 34.25(c)
- [ ] M. Records of inventories were not maintained. 10 CFR 34.26
- [ ] N. Utilization logs were not maintained. 10 CFR 34.27

Charles E Coner — CHARLES E CONER
(AEC Compliance Inspector)

6. LICENSEE'S ACKNOWLEDGMENT

The AEC Compliance Inspector has explained and I understand the items of noncompliance listed above. The items of noncompliance will be corrected within the next 30 days.

Information in this record was deleted
in accordance with the Freedom of Information
Act, exemptions 6
FOIA-2006-0238

(Date) (Licensee Representative — Title or Position)

ORIGINAL: LICENSEE. COPIES: [ ] CO REGION [ ] CO HEADQUARTERS [ ] CO ENFORCEMENT

nn13

Portions Ex 6

Form AEC-591
(7/67)

UNITED STATES ATOMIC ENERGY COMMISSION
DIVISION OF COMPLIANCE

INSPECTION FINDINGS AND LICENSEE ACKNOWLEDGMENT

GTX

1. LICENSEE	2. REGIONAL OFFICE
Department of the Army Walter Reed Army Medical Center Washington, D.C. 20012	U. S. ATOMIC ENERGY COMMISSION Division of Compliance, Region I 970 Broad Street Newark, N.J. 07102
3. LICENSE NUMBER(S) 8-1738-3	4. DATE OF INSPECTION June 23, 1969 (reinsp.)

5. INSPECTION FINDINGS

- [X] A. No item of noncompliance was found.
- [ ] B. Rooms or areas were not properly posted to indicate the presence of a RADIATION AREA. 10 CFR 20.203(b) or 34.42
- [ ] C. Rooms or areas were not properly posted to indicate the presence of a HIGH RADIATION AREA. 10 CFR 20.203(c) (1) or 34.42
- [ ] D. Rooms or areas were not properly posted to indicate the presence of an AIRBORNE RADIOACTIVITY AREA. 10 CFR 20.203(d)
- [ ] E. Rooms or areas were not properly posted to indicate the presence of RADIOACTIVE MATERIAL. 10 CFR 20.203(e)
- [ ] F. Containers were not properly labeled to indicate the presence of RADIOACTIVE MATERIAL. 10 CFR 20.203(f) (1) or (f) (2)
- [ ] G. A current copy of 10 CFR 20, a copy of the license, or a copy of the operating procedures was not properly posted or made available. 10 CFR 20.206(b)
- [ ] H. Form AEC-3 was not properly posted. 10 CFR 20.206(c)
- [ ] I. Records of the radiation exposure of individuals were not properly maintained. 10 CFR 20.401(a) or 34.33(b)
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- [ ] N. Utilization logs were not maintained. 10 CFR 34.27

Charles E Comer CHARLES E COMER
(AEC Compliance Inspector)

6. LICENSEE'S ACKNOWLEDGMENT

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(Date) _____ *(Licensee Representative — Title or Position)* _____

ORIGINAL: LICENSEE. COPIES: [ ] CO REGION [ ] CO HEADQUARTERS [ ] CO ENFORCEMENT

Form AEC-591
(7/67)

NITED STATES ATOMIC ENERGY COMMI ON

DIVISION OF COMPLIANCE

INSPECTION FINDINGS AND LICENSEE ACKNOWLEDGMENT

GIV

1. LICENSEE	2. REGIONAL OFFICE
Department of the Army Walter Reed Army Medical Center Washington, D.C. 20021	U. S. ATOMIC ENERGY COMMISSION Division of Compliance, Region I 970 Broad Street Newark, N.J. 07102
3. LICENSE NUMBER(S) 8-1738-4	4. DATE OF INSPECTION June 23 1969 reinsp

5. INSPECTION FINDINGS

- [X] A. No item of noncompliance was found.
- [ ] B. Rooms or areas were not properly posted to indicate the presence of a RADIATION AREA. 10 CFR 20.203(b) or 34.42
- [ ] C. Rooms or areas were not properly posted to indicate the presence of a HIGH RADIATION AREA. 10 CFR 20.203(c) (1) or 34.42
- [ ] D. Rooms or areas were not properly posted to indicate the presence of an AIRBORNE RADIOACTIVITY AREA. 10 CFR 20.203(d)
- [ ] E. Rooms or areas were not properly posted to indicate the presence of RADIOACTIVE MATERIAL. 10 CFR 20.203(e)
- [ ] F. Containers were not properly labeled to indicate the presence of RADIOACTIVE MATERIAL. 10 CFR 20.203(f) (1) or (f) (2)
- [ ] G. A current copy of 10 CFR 20, a copy of the license, or a copy of the operating procedures was not properly posted or made available. 10 CFR 20.206(b)
- [ ] H. Form AEC-3 was not properly posted. 10 CFR 20.206(c)
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- [ ] J. Records of surveys or disposals were not properly maintained. 10 CFR 20.401(b) or 34.43(d)
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- [ ] N. Utilization logs were not maintained. 10 CFR 34.27

Charles E Coner CHARLES E CONER
(AEC Compliance Inspector)

6. LICENSEE'S ACKNOWLEDGMENT

The AEC Compliance Inspector has explained and I understand the items of noncompliance listed above. The items of noncompliance will be corrected within the next 30 days.

(Date) _____ (Licensee Representative — Title or Position) _____

ORIGINAL: LICENSEE. COPIES: [ ] CO REGION [ ] CO HEADQUARTERS [ ] CO ENFORCEMENT

JM

TO: PRN From CEC

Subject: Dept of the Army

Walter Reed Army Medical Center

Washington D.C. 20012

Lic Nos. 08-01758-02, -03, -04 and SNM 472

These licenses are properly classified as follows: -02 G(i) II, and -03, -04 and SNM as G II. I saw no cause for concern for health and safety.

I recommend reinspection as follows: -02 normal interval (1yr) plus 6 mo (12/70)

03, -04 and SNM at normal interval (3yrs) plus 18 mo. (12/73).

REGION I, DIVISION OF COMPLIANCE
NEWARK, NEW JERSEY

~~SPECIAL LIMITED INSPECTION~~

1. Name and address of licensee:
Dept of the Army
Walter Reed Army Medical Center
Washington D.C. 20012

2. Date of Inspection: 6/23/69

3. Type of Inspection: Announced reinspection

4. License number(s), docket number(s), number and date of last amendment for each license. Category and Priority of each license:
8-1738-2 Amend No 20 5/6/69 G(1) II
-3 Amend No 8 12/16/66 G IV
-4 Amend No 8 1/26/67 G IV
SNM-472 D.N. 70-528 Amend No 1 1/30/69 G IV

5. Date of previous inspection: -2 7/66
-3 and -4 1/65, SNM 1/65

6. Is "Company Confidential," or proprietary, or classified information contained in report?
Yes _____ No ✓
(Specify paragraphs)

7. Scope of inspection:
Complete Inspection

8. Charles E Cox
Inspector

7/3/69
Date of Report

Paul B Nelson
Reviewer

7/23/69
Date of Review

Licensee: _____

Summary

Excellent program efficiently administered

Noncompliance and Safety Items

None

Unusual Occurrences None

Status of Previously Reported Noncompliance or Safety Items

Lic - 4 Interlock failure, VS Nuclear Source used when Budd source authorized
All other licenses Clear 591

Management Interview

I congratulated the Executive Officer on an excellent program

Licensee: _____

DETAILS

A. Participants

Maj. W. F. Kendall, RSO
Col. John Maier, MD Chief, Radiation Therapy
Col. M. E Conrad MD Chief Dept of Hematology
LTC D.T. Mahin Director Div. of Nuclear Medicine
Mr. T. B. Boss Chief Dept. of Nucleonics

Executive Officer HQ WRAMC
Col. Andrew J Collyer MSC.

B. Scope of Licensee Program

Lic - 2 Diagnosis and treatment of patients
- 3 Sealed sources for animal irradiators and calibration source
- 4 Teletherapy - 35 patients/day

3 NM Po Be neutron sources and threshold detectors

See also para E below

C. Organization

All material procurement controlled by an authorization program approved by the Radioisotope Committee. All deliveries made to HRD for verification of authorization, assay, and check for removable contamination. Commanding General is chairman of committee RSO reports to Executive Officer. Program is organized in accordance with WRAMC

D. Administrative Control

Regulation 40-10 Health Physics Regulations

E. Use of Material

Incl #1 shows the use under Lic - 2 for the first quarter of 1969
The use under Lic - 3 has not changed since the last inspection. Kendall stated that the calibrator has not yet been put to use
Col. Maier stated that 35 patients/day are treated under Lic No - 4
The Ra-Be sources are used approximately 1/mo. according to Kendall

Licensee: _____

F. Facilities

I noted that the facilities provided the users and the H.P. facilities were satisfactory for the quantity, identity and forms of the authorized materials and the purposes for which the materials were possessed

G. Equipment

I noted that the H.P. office was provided with a quantity and quality of survey and measuring equipment that almost surpassed belief. Kendall stated that no authorization is granted to a user unless he possesses adequate survey equipment to monitor his area after use. He stated that the H.P. technician checks the operation of this equipment during the monthly survey and that all survey equipment is calibrated by H.P. at least semi annually.

H. Radiological Safety Procedures

As shown in the back up to the various licenses there are regulations and S.O.P's for every operation which presents a potential hazard to health. See listing in letter of 15 Aug 1967 in back up to Lic-2. Kendall stated that he conducts 6 training courses (30-40 hrs each) per year for technicians, doctors, nurses, firemen and animal handlers; approx 250 persons/yr. Bulletin boards posted throughout the Center show relevant copies of licenses, AEC-3, 10 CFR 20 and Center Regulations

I. Personnel Monitoring and Exposure to External Radiation

Lexington Blue Grass Depot supplies approx 500 film badges/mo. All exposures >100 mrem/mo. are investigated by an assistant health physics officer to determine cause and preventive action. I examined the file and found the reports to be thorough and positive, showing follow-up. I noted no exposures in excess of 1.25 rem/quarter except those incurred by teletherapy personnel in the incident investigated by Stearns in 1/67. Kendall stated that all persons at the Center who are occupationally exposed to penetrating ionizing radiation are required to wear film badges.

Licensee: _____

J. **Exposure of Employees to Concentrations of Radioactive Materials**

Kendall stated that all personnel who are potentially exposed to internal radiation are examined by whole body counting and by urinalyses (if applicable). I examined his file of bioassay and found that tritium, iodine, P-32 and Am 241 handlers were examined at least quarterly and no significant exposures were found.

K. **Effluents to Unrestricted Areas**

Kendall stated that no liquids are released to the unrestricted area. He stated that the only airborne releases of any significance are the Kr and Xe used on animal research and for diagnostic purposes. His records of these releases showed that the concentrations averaged over a year were negligible

L. **Disposals**

Kendall stated that all solid waste is collected by H.P. personnel, stored until there are at least 50 drums and shipped to Maxey Flats Ky on contract with Edgewood Arsenal. I examined the records and noted that approx 20 tons containing an estimated 129.81 mCi were shipped in 1968. Kendall stated that the users are authorized to dispose of specified quantities of liquid waste in designated sinks. He stated that the users record the quantity identity and date and during the monthly survey these records are collected by the H.P. technician. I noted that the yearly quantities so disposed were less than 200 mCi.

M. **Miscellaneous Surveys, Evaluations and Records**

I examined Kendalls records of monthly surveys and found them to be more than adequate. They showed a thorough survey and follow-up. Occasionally contamination was found, containers were reported to be unlabeled, food was found in refrigerators, instruments were found to be inoperative waste disposal records were found to be incomplete etc. The relevant notification to the user and a record of his corrective action was attached to each report

Licensee: _____

N. Special License Conditions

I reviewed each license condition of each license with Kendall and found no instance of non compliance.

O. Posting and Labeling

All areas, rooms and containers that I saw in the course of my inspection were noted to have been properly posted or labeled.

P. Independent Measurements

Using an Eberline Model E120 GM Survey meter calibrated by Eberline on 2/24 I measured exposure rates in the restricted and unrestricted areas around the teletherapy room, the radium storage room, the Gammacells, the mouse irradiator, the central waste storage area and the materials storage area in the main radioisotope clinic. I found the levels in the restricted areas were not higher than posted and those in the unrestricted areas were not > 0.5 mr/hr

Q. Operations Observed

I had Mr. B. Bass demonstrate the safety features of the 16,000 Ci CoCo mouse irradiator (Lic-03). I noted that they functioned as described in the license backup. I had the tele therapy technicians demonstrate the emergency procedures to be followed in case of malfunction

R. Incidents, Overexposures, Theft or Loss, Equipment Malfunction

Kendall stated that there had been no incidents except for the teletherapy overexposure and the Groner incident since the last inspection.

Licensee: _____

S. Other Information or Continuation from Previous Paragraphs

I checked the leak test records for sealed sources and found no instance in which the licensee had failed to make a timely test or an instance in which the removable contamination exceeded .005 μCi.

MEDEC-RS 22 April 1969

SUBJECT: Radioisotopes in Human Use Activities, RCS MED-197

The Surgeon General
ATTN: MEDPS-PO
Department of The Army
Washington, D.C. 20315

In compliance with para 4a, AR 40-37, the following information is submitted:

a. The WRAMC Radioisotope Committee held a formal special meeting on 14 April 1969 the minutes of which are attached as Incl 1.

b. DF: MEDEC-RS, subject: Report of Radioactive Material - Human Use, Report Period: 1 Jan - 31 Mar 69, 3rd Qtr, FY 69. (Incl 2)

c. The Listing of Radioisotope Committee Membership with Record of Training and Experience for each member remains unchanged from that previously forwarded on 20 Jan 69.

d. Human Use Authorizations approved during the report period:

H-488 - New Issue, CPT William G. Troyer, MC (Incl 3)

e. Listing, Human Users, WRAMC, 17 Jan 69. Record of Training and Experience for CPT Troyer and Dr. Robert M. Rose, M.D. attached (Incl 4)

f. Memo for Record: MEDEC-RS, subject: Radioactive Nuclides in Human Use at WRAMC - Diagnostic Studies and Therapeutic Use, 3 Mar 69 (Incl 5)

FOR THE COMMANDER:

5 Incl
as

R. NYSTROM, Jr.
LTC, MSC
Adjutant

DISPOSITION FORM

(AR 340-15)

REFERENCE OR OFFICE SYMBOL	SUBJECT
MEDEC-RS	Report of Radioactive Material - Human Use Report Period: 1 Jan - 31 Mar 69, 3rd Qtr, FY 69

~~FOR~~ FROM DATE CMT 1

THRU: HPO, WRAMC — NCOIC, NL & TS Br, HP — 18 May 69

TO: Recorder — SFC Bouvier/5104
Radioisotope Committee
WRAMC

1. The following data relates to the radioisotopes in Human Use at WRAMC for the period 1 Jan - 31 Mar 69:

a. Radioisotopes Procured:

131 - I	1050.425 mCi		85 - Sr	5.000 mCi	
125 - I	1.540		137 - Cs	0.016	
51 - Cr	16.880		99 - Mo	2400.000	
59 - Fe	0.099		75 - Se	1.500	
57 - Co	0.338		82 - Br	7.770	
198 - Au	27.880		35 - S	4.000	
197 - Hg	129.710		222 - Rn	7.000	
		GRAND TOTAL		3652.158 mCi	

b. Radioactive material transferred during the report period. None.

c. Radioisotopes Used in Humans:

Principal User	Rank	Auth No.	Activity Used
Canfield, Craig	LTC	H-160-D	0000.000 mCi
Johnston, Gerald S.	LTC	H-274-D	3745.189 mCi
Conrad, Marcel E.	COL	H-277-C	0000.000 mCi
Mahin, Dorsey T.	LTC	H-444-A	0000.000 mCi
Canfield, Craig	LTC	H-453-A	0000.000 mCi
Weiss, Theodore P.	CPT	H-474-A	0000.000 mCi
Troyer, William C.	CPT	H-488	0000.000 mCi
Doty, Donald B.	CPT	H-493	15.305 mCi
			3760.494 mCi

2. In addition to the radioisotopes listed in para 1, above, the following types of sealed sources were used in surgical implants and external application for the treatment of humans by the Radiation Therapy Clinic, WRGH during the period:

Radioisotope	Type Application	Activity Used
226-Ra	Surgical Implants and Application	38377 mg-h
137-Cs	Surgical Implants	21830 mg-h Ra eq
222-Rn	Surgical Implants	5.17 mCi
60-Co	External (Deep Therapy)	2918 Patients Treated

MEDEC-RS 18 May 69

SUBJECT: Report of Radioactive Material - Human Use, 1st Qtr, FY 69

3. Radioactive Material (Human Use) disposed of or lost from inventory through radioactive decay and Total Activity in storage at the end of the report period:

a. Unsealed Sources - Storage: 301.004 mCi
Disposal: 785.071 mCi

b. Sealed Sources - Storage: 6,727 Curies 60-Cobalt Teletherapy Source
638.790 mCi All other sources
Disposal: 227 Curies 60-Cobalt Teletherapy Source Decay
6.470 mCi All other sources

4. New Human Use Authorizations approved, existing Human Use Authorizations reviewed and updated, consolidated or cancelled by the Radioisotope Committee during the report period.

H-160-D reviewed and renewed; LTC Craig J. Canfield, MC, Principal User

H-274-D reviewed and renewed; LTC Geral S. Johnston, MC, Principal User

H-277-C reviewed and renewed; COL Marcel E. Conrad, MC, Principal User

H-444-A reviewed and renewed; LTC Dorsey T. Mahin, MC, Principal User

H-453-A reviewed and renewed; LTC Craig J. Canfield, MC, Principal User

H-488 approved and issued to CPT William G. Troyer, MC for use at Aberdeen Proving Grounds in a Human Use Project involving volunteers.

5. New or improved developments and/or unsolved problems. None.

FOR THE CHIEF, NUCLEAR LAB & TECH SERVICE BRANCH:

JOHN A. BOUVIER
SFC, USA
NCOIC, NL & TS Br

HUMAN USE (WRAMC Regulation 40-10)

sary. Use accepted chemical symbols and abbreviations wherever possible.

: Health Physics Officer Health Physics Survey Section Room #3, WRAIR : Radioisotope Committee, WRAMC	FROM: William G. Troyer, Jr. CPT, MC Dept of Neurophysiology WRAIR X-30837 *(Principal User & Organization)*	DATE 24 Feb 1969

st all CO-WORKERS w/grade & g. Attach compl WRAMC 421a&b not on file w/WRAMC HPO.	*List all TRAINEES w/grade & org. Attach compl WRAMC 421a&b if not on file w/WRAMC HPO.*	*List all TECHNICIANS who will work w/Rada Mtl under this Authorization*
obert M. Rose, M.D. hief, Dept of Psychiatry RAIR	None	Clyde Kenion David Collins Edward Mougey All in Dept of Neuroendocrinology

dioactive Material will be used in USA Human Eng. Lab. Aberdeen P.G. Md. ☒ Unsealed Source

dioactive Material will be stored in WRAIR & USA Human Eng. Lab. Aberdeen P.G. Md. ☐ Sealed Source

scription of Use (*Group uses as* DIAGNOSTIC, THERAPEUTIC, SPECIAL STUDIES, RESEARCH, *or* SEALED SOURCE *as applicable*)

product terial	Chemical and/or Physical Form	Possession Limit	Use	Dosage Range
ategory	I - Diagnostic Procedures			
^{3}H	Epinephrine	2mCi	Turnover Rate	up to 50uCi
^{3}H	Norepinephrine	2mCi	" "	up to 50uCi
^{3}H	Testosterone	0.2mCi	Secretion Rate	up to 15uCi
^{3}H	Cortisol	0.2mCi	" "	up to 15uCi
^{14}C	Epinephrine	2mCi	Turnover Rate	up to 50uCi
^{14}C	Norepinephrine	2mCi	" "	up to 50uCi
^{14}C	Testosterone	0.2mCi	Secretion Rate	up to 15uCi
^{14}C	Cortisol	0.2mCi	" "	up to 15uCi

eck one block in each section

☐ I have complied with the provisions of AR 40-7 (*Clinical Use of Investigational Drugs*) and all other applicabel administrative requirements.

☒ AR 40-7 does not apply.

☒ I have complied with the provisions of AR 70-25 (*Use of Volunteers as Subjects of Research*), and reporting requirements of AR 40-37 (*Radioisotope License Program (HUMAN USE)*).

☐ Human Volunteers will not be used under this Authorization.

acknowledge my responsibilities as PRINCIPAL SER *as defined in WRAMC Regulation 40-10:*	ADMINISTRATIVE APPROVAL:
William G. Troyer WILLIAM G. TROYER, Jr. CPT, MC Dept of Neurophysiology, WRAIR *(Signature of Principal User)*	David McK. Rioch DAVID McK. RIOCH, M.D. Director, Div of Neuropsychiatry, WRAIR *(Signature of C of Svc, Dept, or Div)*

WRAMC RADIOISOTOPE COMMITTEE APPROVAL

PPROVED: William F Kendall WILLIAM F. KENDALL MAJ, MSC Health Physics Officer	APPROVED: Longstreet C Hamilton LONGSTREET C. HAMILTON COL, MC Member Subcommittee	AUTHORIZATION NO. H 488 REVIEW DATE FEB 70

JAN 17 1969

HUMAN USERS, WRAMC

NAME & RANK	AUTHORIZATION #	DEPARTMENT	TELEPHONE
CANFIELD, C.J., LTC, MC	H-160-D	Division of Medicine, WRAIR	3529
*JOHNSTON, G.S.,LTC, MC	H-274-D	Radioisotope Clinic, WRGH	3313
II Residents (Trainees)	H-274-D	Radioisotope Clinic, WRGH	3313
CONRAD, M.E., COL, MC	H-277-C	Hematology, WRAIR	3358
Lodmell, J.G., MAJ, MC	H-274-D	Division of Surgery, WRAIR	3375
*MAHIN, D.T.,LTC, MC	H-444-A	Radiation Biology, WRAIR	3014
Donati, R.M., CPT, MC	H-444-A	Radiation Biology, WRAIR	3014
CANFIELD, C.J.,LTC, MC	H-453-	Department of Metabolism, WRGH, WRAIR	3529
Larested, N.D., MAJ, MC	H-274-D, H-427-B	Radioisotope Clinic, WRGH	3313
*MAIER, J.D., COL, MC	H-274-D, H-427-B	Radiation Therapy, WRGH	3575
Schade, S.G., CPT, MC	H-277-C	Hematology, WRAIR	3358
*DOTY, D.B., CPT, MC	H-493	Division of Surgery, WRGH	3375
*WEIS, T.P., CPT, MC	H-474-A	Dept of Metabolism, WRAIR	2265
Nolph, K., CPT, MC	H-474-A	Dept of Metabolism, WRAIR	2265
Keller, H., MAJ, MC	H-474-A	Dept of Metabolism, WRAIR	2265
Klingenmaier, C.H., CPT, MC	H-493-	Div of Experimental Surgery, WRAIR	3375
*TROYER, W.G. CPT, MC	H – 488	Dept of Neurophysiology, WRAIR	3037

PRINCIPAL USERS:----------( )
Current Human Use Authorizations:---------- ( )
Current Non-Human Use Authorizations:------( )

TRAINING AND EXPERIENCE OF HUMAN USERS
(CR 40-10)

1. USING PHYSICIAN'S NAME, RANK, SERVICE NUMBER, DUTY ASSIGNMENT, DUTY EXTENSION

Troyer, William G. Jr., CPT, MC 05330593
Dept. of Neurophysiology
WRAIR, Ext. 2139, 3037

2. CLINICAL TRAINING AND EXPERIENCE OF PHYSICIAN NAMED IN ITEM 1 ABOVE

(A) ISOTOPE	(B) CONDITIONS DIAGNOSED OR TREATED	(C) NO. CASES OBSERVED (See 1 in key below)	(D) NO. CASES INVOLVING PERSONAL PARTICIPATION (See 2 in key below)
I-131	Diagnosis of thyroid function		
	Dilution studies (using ^{125}I only)		20
	Excretion studies		
	Brain tumor localization		
	Scanning studies		
	Treatment of hyperthyroidism	30	5
	Treatment of cardiac conditions		
	Treatment of thyroid carcinoma		
P-32 Soluble	Treatment of polycythemia	1	
	Treatment of leukemia	1	
	Treatment of bone metastases		
	Tumor localization		
	Intracavitary treatment		
	Interstitial treatment		
Au-198	Intracavitary treatment		
	Interstitial treatment		
	Scanning studies		
Cr-51	Blood determinations		
	Scanning studies		
Co-58 or Co-60	Diagnosis of pernicious anemia	6	
Co-60 I-192	Interstitial treatment		
	Intracavitary treatment		
Co-60 or Cs-137	Teletherapy treatment		
Sr-90	Treatment of superficial diseases of the eye		
Other Isotopes Use back of page	C-14 Excretion rate } -Hormone Activity	9	9
	H-3 Excretion rate } Assay - Human	12	9
	I-125 Cardiac Output	100	100

Key to Column (C) and (D) above

1. *Observation should consist of observing radioisotope administration techniques and discussion with preceptor the case histories to establish most appropriate diagnostic and/or therapeutic procedure, limitation, contraindications, etc.*

2. *Personal participation should consist of (a) supervised examination of patients to determine the suitability for radioisotope diagnosis and/or treatment and recommendation on dosage to be prescribed; (b) collaboration in calibration of the dose and the actual administration of the dose to the patient, including calculation of the radiation dose, related measurements, and plotting of data; and (c) adequate period of training to enable the physician to manage radioactive patients and to follow patients through diagnosis and/or the course of treatment.*

3. DATES AND TOTAL NUMBER OF HOURS OF CLINICAL RADIOISOTOPE TRAINING 1956-1968 approx 200 hrs

4.

THE TRAINING AND EXPERIENCE INDICATED ABOVE WAS OBTAINED UNDER THE SUPERVISION OF: James O. Wynn MD (now at Arkansas Medical School) & Ralph Gorten MD

AT Duke Univ. Med. School (Institution) Name and Address — 30 July 68 (Date of Signature) — William G. Troyer Jr. (Signature of Applicant)

TRAINING AND EXPERIENCE USERS OF RADIOISOTOPES

Dec 68

NAME, RANK, BRANCH, SERVICE NUMBER, SOCIAL SECURITY ACCOUNT NUMBER

TROYER, William Gail, Jr., CPT, MSC, 05330593 SSAN:

PHONE 3037 2139

1. FORMAL EDUCATION: Total Number of Years of Formal Schooling _____

	Higher Educational Institutions Attended	Type of Program Pursued and Dates of Attendance	Degree, Diploma or Certificate Received and Date
a.	Univ Pittsburgh, Med School	Medical School	MD
b.	Univ Oklahoma, Med School	Internship, Residency 60-63	
c.	Duke Med School	Fellowship, Lab Tng 63-65	
d.	Duke Med School	Faculty 65-66	

2. TRAINING IN THE USE OF RADIATION PRODUCING SOURCES AND DEVICES

I have received the following training in the subjects listed below:

HOURS	Formal/On-the-Job Training	Subject Area	Identify where trained by Institution Letter from above and Indicate any additional
30	Formal	in PRINCIPLES & PRACTICES OF RADIATION PROTECTION	a, b, c
30	Formal	in RADIOACTIVITY MEASUREMENT	a & c
0		in STANDARDIZATION	
100	OJT	in MONITORING TECHNIQUES	c
100	OJT	in INSTRUMENTATION	c
100	OJT	in MATHEMATICS & CALCULATIONS BASIC TO THE USE & MEASUREMENT OF RADIOACTIVITY	c
100	OJT	in BIOLOGICAL EFFECTS OF RADIATION	c

(Use additional sheets or reverse of this form to describe any other training received in the use of radiation producing sources and devices.)

3. EXPERIENCE IN THE USE OF RADIATION PRODUCING SOURCES AND DEVICES. *(Show Actual Use of Radioisotopes or Equivalent Experience.)*

ISOTOPE	MAXIMUM AMOUNT	WHERE EXPERIENCE WAS GAINED	DURATION OF EXPERIENCE	TYPE OF USE
125-I	150 uCi/Pt	Duke Medical School	6 Mos	Human
14-C	50 uCi/Pt	Duke Medical School	2 Yrs	Animals
3-H	50 uCi/Pt	Duke Medical School	2 Yrs	&Invitro

TRAINING AND EXPERIENCE OF PRINCIPAL USERS OF RADIOISOTOPES

NAME AND RANK: William G. Troyer, Jr CPT MC

DATE: 29 July '68

TYPE TRAINING	WHERE TRAINED	DURATION OF TRAINING	ON THE JOB (Check) YES	ON THE JOB (Check) NO	FORMAL COURSE(S) YES	FORMAL COURSE(S) NO
1. Principles and practices of radiation protection	University Pittsburgh Med School	4 years			X	
	Duke Medical School	2 years	X			
2. Radioactivity measurement standardization and monitoring techniques and instruments	Duke Medical School	2 years	X			X
3. Mathematics and calculations basic to the use and measurement of radioactivity	Duke Medical School	2 years	X			X
4. Biological effects of radiation	Duke Univ Med School	2 years	X		X	

EXPERIENCE WITH RADIATION *(Actual Use of Radioisotopes or Equivalent Experience)*

ISOTOPE	MAXIMUM AMOUNT	WHERE EXPERIENCE WAS GAINED	DURATION OF EXPERIENCE	TYPE OF USE
^{125}I	150 uc/pt	Duke Univ Med School	6 mos.	human Cardiac Or
^{14}C	50 uc/pt	Duke Univ Med School	2 yrs.	*human, anim
^{3}H	50 uc/pt	Duke Univ Med School	2 yrs	*& in vitro
				* Hormone Activity Assay-Human

WRAMC FORM 421 a (SUPERSEDES WRAMC FORM 420, EDITION OF 15 OCT.'61 WHICH IS OBSOLETE)
15 MAY 1963

TRAINING AND EXPERIENCE OF HUMAN USERS
(CR 40-10)

2. USING PHYSICIAN'S NAME, RANK, SERVICE NUMBER, DUTY ASSIGNMENT, DUTY EXTENSION

Robert M. Rose 05013107
CPT, MC
Chief, Dept of Psychiatry
WRAIR, Ext. 5261

2. CLINICAL TRAINING AND EXPERIENCE OF PHYSICIAN NAMED IN ITEM 1 ABOVE

(A) ISOTOPE	(B) CONDITIONS DIAGNOSED OR TREATED	(C) NO. CASES OBSERVED *(See 1 in key below)*	(D) NO. CASES INVOLVING PERSONAL PARTICIPATION *(See 2 in key below)*
I-131	Diagnosis of thyroid function	4	
	Dilution studies		
	Excretion studies		
	Brain tumor localization		
	Scanning studies	2	
	Treatment of hyperthyroidism		
	Treatment of cardiac conditions		
	Treatment of thyroid carcinoma		
P-32 Soluble	Treatment of polycythemia		
	Treatment of leukemia	2	1
	Treatment of bone metastases		
	Tumor localization		
	Intracavitary treatment		
	Interstitial treatment		
Au-198	Intracavitary treatment		
	Interstitial treatment		
	Scanning studies		
Cr-51	Blood determinations	1	
	Scanning studies		
Co-58 or Co-60	Diagnosis of pernicious anemia		
Co-60 1-192	Interstitial treatment		
	Intracavitary treatment		
Co-60 or Cs-137	Teletherapy treatment		
Sr-90	Treatment of superficial diseases of the eye		
Other Isotopes Use back of page			

Key to Column (C) and (D) above

1. *Observation should consist of observing radioisotope administration techniques and discussion with preceptor the case histories to establish most appropriate diagnostic and/or therapeutic procedure, limitation, contraindications, etc.*

2. *Personal participation should consist of (a) supervised examination of patients to determine the suitability for radioisotope diagnosis and/or treatment and recommendation on dosage to be prescribed; (b) collaboration in calibration of the dose and the actual administration of the dose to the patient, including calculation of the radiation dose, related measurements, and plotting of data; and (c) adequate period of training to enable the physician to manage radioactive patients and to follow patients through diagnosis and/or the course of treatment.*

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

4. THE TRAINING AND EXPERIENCE INDICATED ABOVE WAS OBTAINED UNDER THE SUPERVISION OF: Harvard Med. School Instructors& Edward R. Mougey, Dept. of Neuroendocrinology, WRAIR

AT Harvard Med. School 30 July 68 Robert M. Rose Lt Col

(Signature of AP

TRAINING AND EXPERIENCE OF PRINCIPAL USERS OF RADIOISOTOPES

NAME AND RANK: Robert M. Rose CPT, MC

DATE: 29 July 68

TYPE TRAINING	WHERE TRAINED	DURATION OF TRAINING	ON THE JOB (Check) YES	ON THE JOB (Check) NO	FORMAL COURSE(Check) YES	FORMAL COURSE(Check) NO
1. Principles and practices of radiation protection	Harvard Medical School 57-61 Dept. of Neuroendocrinology, WRAIR Assistant Chief 65-68	4 years 2 Years	X		X	
2. Radioactivity measurement standardization and monitoring techniques and instruments	Dept. of Neuroendocrinology	2 Years	X		X	
3. Mathematics and calculations basic to the use and measurement of radioactivity	Harvard Medical School	4 Years	X		X	
4. Biological effects of radiation	Harvard Medical School	4 Years	X		X	

EXPERIENCE WITH RADIATION (*Actual Use of Radioisotopes or Equivalent Experience*)

ISOTOPE	MAXIMUM AMOUNT	WHERE EXPERIENCE WAS GAINED	DURATION OF EXPERIENCE	TYPE OF USE
Triaiated Acetic Anhydride	100 - 500uCi	Dept. of Neuroendocrinology, WRAIR	2 years	in-vitro

WRAMC FORM 421 a (SUPERSEDES WRAMC FORM 420, EDITION OF 15 OCT.'61 WHICH IS OBSOLETE)
15 MAY 1963

MEDEC-RS 3 March 1969

MEMO FOR RECORD:

SUBJECT: Radioactive Nuclides in Human Use at WRAMC

WRAMC Authorization	Radioisotope	Purpose	Range of Dose
		DIAGNOSTIC STUDIES	
H-160-D	3-H	Total Body Water	Up to 1 mCi
	35-S	Extra Cellular Fluid	Up to 50 uCi
	51-Cr	Red Cell Mass	Up to 40 uCi
	51-Cr	Plasma Volume	Up to 40 uCi
	125-I	Plasma Volume	Up to 7 uCi
	131-I	Plasma Volume	Up to 7 uCi
H-274-D	See Incl 1.		
H-277-C	59-Fe	Diagnostic, Special Studies	0.001 - 0.01 mCi
	55-Fe	and Research	0.1 - 0.3 mCi
	51-Cr	ditto	0.05 - 0.1 mCi
	14-C	ditto	0.001 - 0.005 mCi
	75-Se	Platelet Survival	0.01 mCi
H-444-A	See Incl 2.		
H-453-A	59-Fe	Ferrokinetic Studies	4 - 8 uCi
	51-Cr	Blood Dilution Studies	Up to 50 uCi
H-474-A	125-I	Renal Blood Flow	Up to 100 uCi
	131-I	Glomerular Filtration Rate	Up to 100 uCi
H-488	3-H	Turnover & Secretion Rate	Up to 50 uCi
	14-C	Turnover & Secretion Rate	Up to 50 uCi
H-493	35-S	Extracellular Fluid	Up to 0.1 mCi
	51-Cr	Red Cell Mass	Up to 0.05 mCi
	125 & 131-I	Blood Volume	Up to 0.006 mCi
	3-H	Total Body Water	Up to 0.25 mCi

2 Incl
as

JOHN A. BOUVIER
SFC, USA
Health Physics
WRAMC

MEDEC-RS

3 March 1969

MEMO FOR RECORD:

SUBJECT: Radioactive Nuclides in Human Use at WRAMC - THERAPEUTIC

WRAMC Authorization	Radioisotope	Purpose
H-427-B	226-Ra	Interstitial, Intracavitary
	137-Cs	Intracavitary
	198-Au	Interstitial
	222-Rn	Interstitial
	192-Ir	Interstitial
	60-Co	Teletherapy
	90-Sr	Surface Applicator

John A Bouvier

JOHN A. BOUVIER
SFC, USA
Health Physics
WRAMC

PRODUCT MATERIAL	CHEMICAL AND/OR PHYSICAL FORM	POSSESSION LIMIT	USE	ANTICIPATED DOSES (in microcuries)
ntinuation of ategory II - DIAGNOSTIC				
hromium 51	Chromated Human Serum Albumin	5 millicuries	Protein loss	100 - 250
romium 51	Chromated Human Serum Albumin	5 millicuries	Placental localization	5 - 25
odium 22 or 24	Sodium Chloride	1 millicurie	Body sodium	0.5 - 40
otassium 42	Potassium Chloride	1 millicurie	Body potassium	0.5 - 40
echnetium 99m	Pertechnetate	500 millicuries	Brain scans	700 - 8000
odine 131	Macro-aggregated Iodinated Human Serum Albumin	30 millicuries	Lung scans	50 - 150
odine 131	Macro-aggregated Iodinated Human Serum Albumin	30 millicuries	Liver scans	50 - 150
inc 69m	Zinc Chloride	25 millicuries	Liver scans	50 - 1500
inc 69m	Zinc Chloride	25 millicuries	Prostate scans	50 - 1500
opper 64	Copper	10 millicuries	Copper clearance	10 - 100
rontium 87m	Strontium nitrate	10 millicuries	Bone scans	1000 - 1500
odine 131	Iodinated Fibrinogen	6 millicuries	Thrombus localization	100 - 150
ubidium 86	Rubidium Chloride	1 millicurie	"In vitro" assay of cardiac glycosides	
elenium 75	Selenomethionine	10 millicuries	Pancreas scan	100 - 250
enon 133 (1)	Gas	30 millicuries	Pulmonary Function Study	3 - 10 mCi
ydrogen 3	Tritiated Water	10 millicuries	Diagnostic	1 - 2 mCi
romide 82	Sodium Bromide	5 millicuries	Diagnostic	50 uCi

TES: (1) 133-Xe added Eff 19 Feb 68 (See cancelled WRAMC Auth H-476) Cap jab

PRODUCT MATERIAL	CHEMICAL AND/OR PHYSICAL FORM	POSSESSION LIMIT	USE	ANTICIPATED DOSE (in microcuries)
Continuation of Category II - DIAGNOSTIC				
Chromium 51	Chromated Human Serum Albumin	5 millicuries	Protein loss	100 - 250
Chromium 51	Chromated Human Serum Albumin	5 millicuries	Placental localization	5 - 25
Sodium 22 or 24	Sodium Chloride	1 millicurie	Body sodium	0.5 - 40
Potassium 42	Potassium Chloride	1 millicurie	Body potassium	0.5 - 40
Technetium 99m	Pertechnetate	500 millicuries	Brain scans	700 - 8000
Iodine 131	Macro-aggregated Iodinated Human Serum Albumin	30 millicuries	Lung scans	50 - 150
Iodine 131	Macro-aggregated Iodinated Human Serum Albumin	30 millicuries	Liver scans	50 - 150
Zinc 69m	Zinc Chloride	25 millicuries	Liver scans	50 - 1500
Zinc 69m	Zinc Chloride	25 millicuries	Prostate scans	50 - 1500
Copper 64	Copper	10 millicuries	Copper clearance	10 - 100
Strontium 87m	Strontium nitrate	10 millicuries	Bone scans	1000 - 1500
Iodine 131	Iodinated Fibrinogen	6 millicuries	Thrombus localization	100 - 150
Rubidium 86	Rubidium Chloride	1 millicurie	"In vitro" assay of cardiac glycosides	
Selenium 75	Selenomethionine	10 millicuries	Pancreas scan	100 - 250
Xenon 133 (1)	Gas	30 millicuries	Pulmonary Function Study	3 - 10 mCi
Hydrogen 3	Tritiated Water	10 millicuries	Diagnostic	1 - 2 mCi
Bromide 82	Sodium Bromide	5 millicuries	Diagnostic	50 uCi

NOTES: (1) 133-Xe added Eff 19 Feb 68 (See cancelled WRAMC Auth H-476) Cof jab

NOV 6 1967

YPRODUCT MATERIAL	CHEMICAL AND/OR PHYSICAL FORM	POSSESSION LIMIT	USE	ANTICIPATED DOSES (in microcuries)
Category III - THERAPEUTIC				
Iodine 131	Iodide	30 millicuries	Treatment of hyperthyroidism and/or cardiac dysfunction.	3 - 10
Phosphorus 32	Soluble Phosphate	25 millicuries	Treatment of polycythemia vera and leukemia.	1 - 15
Category IV - THERAPEUTIC				
Iodine 131	Iodide	200 millicuries	Treatment of thyroid carcinoma	80 - 120
Gold 198	Colloidal	200 millicuries	Intracavitary treatment of pleural effusions and/or ascites.	80 - 120
Phosphorus 32	Colloidal Chronic Phosphate	25 millicuries	Intracavitary treatment of pleural effusions and/or ascites.	3 - 20

U. S. ATOMIC ENERGY COMMISSION
BYPRODUCT MATERIAL LICENSE

Amendment No. 27

Pursuant to the Atomic Energy Act of 1954 and Title 10, Code of Federal Regulations, Chapter 1, Parts 30, 2, 33, 34, and 35, and in reliance on statements and representations heretofore made by the licensee, a license hereby issued authorizing the licensee to receive, acquire, own, possess, transfer and import byproduct material listed below; and to use such byproduct material for the purpose(s) and at the place(s) designated below. his license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 954, and is subject to all applicable rules, regulations, and orders of the Atomic Energy Commission now or ereafter in effect and to any conditions specified below.

Licensee	In accordance with application dated July 31, 1969,
Department of the Army Walter Reed Army Medical Center Washington, D. C. 20012	3. License number 08-01738-02 is amended in its entirety to read as follows:
	4. Expiration date August 31, 1974
	5. Reference No.

6. Byproduct material (element and mass number)	7. Chemical and/or physical form	8. Maximum amount of radioactivity which licensee may possess at any one time
A. Any byproduct material with Atomic Nos. 3-83, inclusive	A. Any	A. 400 millicuries of each except: Iodine 131 2000 millicuries Xenon 133 1500 millicuries Krypton 85 1500 millicuries Gold 198 1000 millicuries Phosphorus 32 1000 millicuries Sulfur 35 1000 millicuries Carbon 14 1000 millicuries Total not to exceed 15 curies. Ex 2
B. Hydrogen 3	B. Any	B. 5000 millicuries total
C. Cesium 137	C. Sealed Sources	C.
D. Molybdenum 99	D. E. R. Squibb and Sons Model No. 08871; NEN Picker Model No. 602; Abbott Laboratories Model No. 7721; Mallinckrodt Chemical Works Model Nos. 006 through 009 Generators	D. 1500 millicuries
E. Technetium 99m	E. Pertechnetate	E. 750 millicuries
F. Neptunium 237	F. Any	F. 10 millicuries
G. Americium 241	G. Any	G. 100 microcuries

Portions Ex 2

nn14

Information in this record was deleted
in accordance with the Freedom of Information
Act, exemptions 2
FOIA- 2006-0238

6. Byproduct material (element and mass number)	7. Chemical and/or physical form	8. Maximum amount of radio activity which licensee may possess at any one time
H. Polonium 210	H. Any	H. 15 millicuries
I. Cesium 137	I. Sealed Sources	I. Ex. 2
J. Cobalt 60	J. Sealed Sources	J. total
K. Strontium 90	K. Sealed Sources in Gas Chromatography Devices	K. total
L. Cesium 137	L. Sealed Source	L. 1 source of

9. Authorized use

A. through E. Medical research, diagnosis and therapy. Research and development as defined in Section 30.4(q), 10 CFR 30, "Rules of General Applicability to Licensing of Byproduct Material."

F. through K. Research and Development as defined in Section 30.4(q), 10 CFR Part 30, "Rules of General Applicability to Licensing of Byproduct Material."

L. For use in Ex 2 Calibrator for calibration of instruments at the Health Physics Calibration Range, Building 101, Forest Glen Section, Walter Reed Army Medical Center.

CONDITIONS

10. Byproduct material shall be used at Walter Reed Army Medical Center, Washington, D. C. and Forest Glen Annex, Walter Reed Medical Center, Montgomery County, Maryland.

(continued) **CONDITIONS**

11. Byproduct material designated below may be used at the U.S. Army Medical Research Institute for Infectious Diseases and Ward 200, Walter Reed General Hospital, Fort Detrick, Maryland: 5 millicuries of Carbon 14 and Iron 59; 10 millicuries each of Sulfur 35, Calcium 45, and Chromium 51; 25 millicuries each of Hydrogen 3, Potassium 42, Iodine 131 and Iodine 125; 50 millicuries of Phosphorus 32.

12. One (1) millicurie of Iodine 131 may be used at the Andrew Rader U. S. Army Clinic, Fort Myer, Virginia.

13. Twelve (12) millicuries each of Carbon 14 and Hydrogen 3 may be used at the U.S. Army Human Engineering Laboratories, Aberdeen Proving Ground, Maryland.

14. The licensee shall comply with the provisions of Title 10, Chapter 1, Code of Federal Regulations, Part 20, "Standards for Protection Against Radiation."

15. A. Byproduct material shall be used by, or under the supervision of, individuals designated by the Walter Reed Army Medical Center Radioisotope Committee.

    B. The use of byproduct material in or on humans shall be by a physician.

16. A. Each sealed source acquired from another person and containing byproduct material, other than Hydrogen 3, with a half-life greater than thirty days and in any form other than gas shall be tested for contamination and/or leakage prior to use. In the absence of a certificate from a transferor indicating that a test has been made within six months prior to the transfer, the sealed source shall not be put into use until tested.

16. continued

CONDITIONS

B. Each sealed source fabricated by the licensee shall be inspected and tested for construction defects, leakage, and contamination prior to use or transfer as a sealed source. If the inspection or test reveals any construction defects or 0.005 microcurie or greater of contamination, the source shall not be used or transferred as a sealed source until it has been repaired and decontaminated.

C. Each sealed source containing byproduct material, other than Hydrogen 3, with a half-life greater than thirty days and in any form other than gas shall be tested for leakage and/or contamination at intervals not to exceed six months except that each source designed for the purpose of emitting alpha particles shall be tested at intervals not to exceed three months.

D. The test shall be capable of detecting the presence of 0.005 microcurie of radioactive material on the test sample. The test sample shall be taken from the sealed source or from the surfaces of the device in which the sealed source is permanently or semipermanently mounted or stored on which one might expect contamination to accumulate. Records of leak test results shall be kept in units of microcuries and maintained for inspection by the Commission.

E. If the test required by Subsection A. or C. of this condition reveals the presence of 0.005 microcurie or more of removable contamination, the licensee shall immediately withdraw the sealed source from use and shall cause it to be decontaminated and repaired or to be disposed of in accordance with Commission regulations. A report shall be filed within 5 days of the test with the Director, Division of Materials Licensing, U. S. Atomic Energy Commission, Washington, D. C., 20545, describing the equipment involved, the test results, and the corrective action taken. A copy of such report shall also be sent to the Director, Region I, Division of Compliance, USAEC, 970 Broad Street, Newark, New Jersey, 07102.

(continued) CONDITIONS

17. Byproduct material to be administered to humans shall be procured in separated, prepackaged, precalibrated form from a supplier who manufactures or repackages the product under appropriate pharmaceutical controls related to assay, identity, quality, purity, sterility, and pyrogenicity.

18. Patients containing Iodine 131 for the treatment of thyroid carcinoma or patients containing therapeutic quantities of Gold 198 shall remain hospitalized until the residual activity is 30 millicuries or less.

19. Patients containing radioactive implants, except gold 198 seeds, shall remain hospitalized until the implants are removed.

20. Iodine 131 labeled Macroaggregated Iodinated Human Serum Albumin shall be procured from a supplier who holds an unsuspended or unrevoked license issued by the Secretary, Department of Health, Education, and Welfare, to propagate or manufacture and prepare, label, or distribute this material pursuant to Title 42, Chapter 1, Code of Federal Regulations, Part 73, "Biological Products."

21. Chromium 51 labeled Human Serum Albumin shall be procured from a supplier who holds an unsuspended or unrevoked license issued by the Secretary, Department of Health, Education, and Welfare, to propagate or manufacture and prepare, label, or distribute this material pursuant to Title 42, Chapter 1, Code of Federal Regulations, Part 73, "Biological Products."

22. Technetium 99m Pertechnetate may be eluted and prepared from a Molybdenum 99/Technetium 99m generator in accordance with statements, representations, and procedures contained in applications dated August 15, 1967, and February 14, 1969.

(continued) CONDITIONS

23. Iodine 131 labeled Colloidal (Microaggregated) Human Serum Albumin shall be procured from a supplier who holds an unsuspended or unrevoked license issued by the Secretary, Department of Health, Education, and Welfare, to propagate or manufacture and prepare, label, or distribute this material pursuant to Title 42, Chapter 1, Code of Federal Regulations, Part 73, "Biological Products."

24. Except as specifically provided otherwise by this license, the licensee shall possess and use byproduct material described in Items 6, 7, and 8 of this license in accordance with statements, representations, and procedures contained in applications dated March 30, 1967; August 15, 1967; April 30, 1968; November 1, 1968; February 14, 1969; and July 31, 1969.

For the U. S. Atomic Energy Commission
Original Signed by
Nathan Bassin
by Isotopes Branch
Division of Materials Licensing
Washington, D. C. 20545

Date AUG 21 1969

8/21/69

MAY 19 1971

3962

Gen W. Roy, Chief, Materials and Fuel Facilities
Branch, Division of Compliance, HQ

COMPLIANCE INQUIRY MEMORANDUM
DEPARTMENT OF THE ARMY
WALTER REED ARMY MEDICAL CENTER
WASHINGTON, D.C.
LICENSE NO. 08-01738-02
EXPOSURE REPORTED AND FOUND INVALID

On May 7, 1971, Captain James Morrison, Chief, Nuclear Laboratory and Technical Services, Health Physics Office, Walter Reed Army Medical Center, informed Charles E. Coner, Radiation Specialist, by telephone, that a film badge issued to Specialist-5 for the period December 6, 1970 to January 7, 1971, had been reported on May 6, 1971, as having been exposed to 7.4 rem of gamma radiation (>600 KEV).

Morrison stated that could not have received the indicated exposure during the December 6, 1970 through January 7, 1971 interval because had been on leave for the entire period. He stated that when the exposed badge should have been collected for turn-in to Lexington Signal Depot, on January 6, 1971, it could not be found. When returned from leave, on January 11, 1971, was asked by the health physics technician to turn-in December film badge. informed Morrison that searched the Radioisotope Clinic, where was assigned as a technician, but was unable to find the badge. Morrison stated that the health physics technician also searched for the badge and asked the other technicians if they had any knowledge of its whereabouts, but was unable to find the badge.

Morrison stated that "sometime" in February, 1971 the missing film badge was found in an adjacent laboratory, the Radiopharmacy Laboratory, and turned in to the Health Physics Office. Clipped to the missing badge was a wrist film badge that had also been assigned to for the December 6, 1970 through January 7, 1971 period. Both badges were held at the Health Physics Office until April 30, 1971; at which date they were mailed with other "late badges" to Lexington Signal Depot. According to Morrison, the badges were received at Lexington Signal Depot on May 4, 1971.

Information in this record was deleted
in accordance with the Freedom of Information
Act, exemptions 6
FOIA 2006-0238

EX.

OFFICE ▶	CO					
SURNAME ▶	Coner/nvk	Nelson	Ryan			
DATE ▶	5/17/71		5/18/71			

Coner determined by questioning Morrison that [redacted] wrist badge had shown an exposure of 1.9 rem for the period December 6, 1970 through January 7, 1971, and that Lexington Signal Depot had reported that they had not been able to determine if the exposures to the badges had been single or multiple exposures or whether the badge holders had been contaminated. Coner suggested that Morrison determine if any individual in the Radioisotope Clinic or the Radiopharmacy Laboratory had failed to turn-in his film badge for the month of December. 1970, since such an individual might be suspected to have used [redacted] badge during that time period.

Coner suggested that Morrison continue his investigation, and if by 4:30 p.m., he and the Radioisotope Committee had concluded that the reported exposure had not been received by any individual, he should inform Coner by telephone and prepare a written report of his investigation for the Walter Reed files. On the other hand, if his investigation showed that there was a reasonable doubt concerning the exposure, he should confirm his telephone report with a teletype message, continue his investigation and prepare a 30-day report.

At 4:45 p.m. on May 7, 1971, Lt. Col. Randy Miller, Health Physics Officer for the subject licensee, informed Coner, by telephone, that continued investigation had convinced the Radioisotope Committee that no individual had worn [redacted] film badge and that the exposure was therefore not reportable. He stated that the Committee had concluded that;

1. [redacted] could not have worn the badge during the reported interval since [redacted] was on leave.

2. Since the film badges are color-coded by months, [redacted] use of the December badge during January would have been noticed by [redacted] fellow workers.

3. Exposures to all other individuals working in the vicinity of the Radioisotope Clinic were accounted for by film badges.

4. There were no unusual exposures shown by the film badge records for December, January or February.

5. The film badges (whole body and wrist) had been lost for ten weeks in areas (Radioisotope Clinic and/or Radiopharmacy Laboratory) where the probability of cumulative exposures of this magnitude was reasonable.

Miller stated that the personnel monitoring program would be modified in two ways as a result of this excessive badge exposure. He stated that film badge racks will be provided for the storage of all film badges that are not in use and personnel will be directed to use the racks. He also stated that the practice of holding "late turn-in" film badges for transmittal to Lexington Signal Depot every quarter will be changed so that the late badges are sent in with the next shipment to Lexington Signal Depot.

During the next inspection of this licensed program, December. 1971, the inspector will review the licensee's procedures for the administration of the film badge program.

No further review of this occurrence will be made. Closed.

Paul R. Nelson
Senior Radiation Specialist

CO:I:CEC

Enclosure:
Record Card

FORM AEC-374C
(6-72)
10 CFR 20.30

U. S. ATOMIC ENERGY COMMISSION
BYPRODUCT MATERIAL LICEN.

Supplementary Sheet

License Number 08-01738-02

Amendment No. 39

Department of the Army
Walter Reed Army Medical Center
Washington, D. C. 20012

In accordance with letter dated May 17, 1973, License Number 08-01738-02 is amended as follows:

To add:

6. Byproduct material (element and mass number)	7. Chemical and/or physical form	8. Maximum amount of radioactivity which licensee may possess at any one time
N. Americium 241	N. Sealed Source	N.

9. Authorized use

N. Medical research.

Condition 24. is amended to read:

24. Except as specifically provided otherwise by this license, the licensee shall possess and use byproduct material described in Items 6, 7, and 8 of this license in accordance with statements, representations, and procedures contained in applications dated March 30, 1967, August 15, 1967, April 30, 1968, November 1, 1968, February 14, 1969, and July 31, 1969; and letter dated May 17, 1973.

Information in this record was deleted in accordance with the Freedom of Information Act, exemptions 2
FOIA- 2006-0238

EX. 2

For the U. S. Atomic Energy Commission

Date SEP 14 1973

by Original Signed By John E. Bewyer
Materials Branch
Directorate of Licensing
Washington, D. C. 20545

DMC/8C

9/14/73

Form AEC-313
8-64
10 CFR 30

UNITED STATES ATOMIC ENERGY COMMISSION

APPLICATION FOR BYPRODUCT MATERIAL LICENSE

Form approved
Budget Bureau No. 38-R0027

INSTRUCTIONS. – Complete Items 1 through 16 if this is an initial application or an application for renewal of a license. Information contained in previous applications filed with the Commisson with respect to Items 8 through 15 may be incorporated by reference provided *references are clear and specific.* Use supplemental sheets where necessary. Item 16 must be completed on all applications. Mail two copies to: U.S. Atomic Energy Commission, Washington, D.C., 20545, Attention: Isotopes Branch, Division of Materials Licensing. Upon approval of this application, the applicant will receive an AEC Byproduct Material License. An AEC Byproduct Material License is issued in accordance with the general requirements contained in Title 10, Code of Federal Regulations, Part 30, and the Licensee is subject to Title 10, Code of Federal Regulations, Part 20.

1. (a) NAME AND STREET ADDRESS OF APPLICANT. *(Institution, firm, hospital, person, etc. Include ZIP Code.)*

Department of the Army
Walter Reed Army Medical Center (WRAMC)
Washington, D.C. 20012

(b) STREET ADDRESS(ES) AT WHICH BYPRODUCT MATERIAL WILL BE USED. *(If different from 1 (a). Include ZIP Code.)*

1. Walter Reed Army Medical Center, Washington, D.C. 20012
2. Forest Glen Section & Annex, Montgomery County, Maryland, 20910

(See Continuation Sheet)

2. DEPARTMENT TO USE BYPRODUCT MATERIAL

As designated by the Radioisotope Committee.

3. PREVIOUS LICENSE NUMBER(S). *(If this is an application for renewal of a license, please indicate and give number.)*

Renewal of 08-01738-02 in its entirety to read as follows.
Expiration Date 31 Aug 74

4. INDIVIDUAL USER(S). *(Name and title of individual(s) who will use or directly supervise use of byproduct material. Give training and experience in Items 8 and 9.)*

Individual(s) approved by the Radioisotope Committee, Commander, Walter Reed Army Medical Center, Chairman.

SEE SUPPLEMENTS B AND D.

5. RADIATION PROTECTION OFFICER *(Name of person designated as radiation protection officer if other than individual user. Attach resume of his training and experience as in Items 8 and 9.)*

Ref: AR 40-14 & AR 40-37,
The Health Physics Officer will be appointed by the Commander, Walter Reed Army Medical Center, Chairman of the Radioisotope Committee. SEE SUPPLEMENTS A AND B

6. (a) BYPRODUCT MATERIAL. *(Elements and mass number of each.)*	(b) CHEMICAL AND/OR PHYSICAL FORM AND MAXIMUM NUMBER OF MILLICURIES OF EACH CHEMICAL AND/OR PHYSICAL FORM THAT YOU WILL POSSESS AT ANY ONE TIME. *(If sealed source(s), also state name of manufacturer, model number, number of sources and maximum activity per source.)*	
A. Any byproduct material with Atomic Nos. 3-83, inclusive	A. Any	A. 400 millicuries of each except: Iodine 131 - 2000 millicuries Xenon 133 - 5000 millicuries Krypton 85 - 5000 millicuries Gold 198 - 1000 millicuries Phosphorus 32 - 2000 millicuries Sulfur 35 - 1000 millicuries Carbon 14 - 2000 millicuries Iodine 125 - 1000 millicuries Iridium 192 - Total not to exceed 26 Curies
B. Hydrogen 3 C. Cesium 137	B. Any C. Sealed Sources	B. 10,000 millicuries C.

(SEE CONTINUTATION SHEET)

Information in this record was deleted in accordance with the Freedom of Information Act, exemptions FOIA

7. DESCRIBE PURPOSE FOR WHICH BYPRODUCT MATERIAL WILL BE USED. *(If byproduct material is for "human use," supplement A (Form AEC-313a) must be completed in lieu of this item. If byproduct material is in the form of a sealed source, include the make and model number of the storage container and/or device in which the source will be stored and/or used.)*

A. through E. Medical research, diagnosis and therapy. Research and development as defined in Section 30.4(q), 10 CFR 30, "Rules of General Applicability to Licensing of Byproduct Material."

F. through K. Research and Development as defined in Section 30.4(q), 10 CFR Part 30, "Rules of General Applicability to Licensing of Byproduct Material."

L. For use in Calibration for calibration of instruments at the Health Physics Calibration Range, Walter Reed Army Medical Center. SEE SUPPLEMENT G for complete description.

M. For use as standards or reference sources.

N. Medical research. SEE SUPPLEMENT G for complete description.

50117

(Continued on reverse side)

EX. 2

TRAINING AND EXPERIENCE OF EACH INDIVIDUAL NAMED IN ITEM 4 *(Use supplemental sheets if necessary)*

8. TYPE OF TRAINING	WHERE TRAINED	DURATION OF TRAINING	ON THE JOB (Circle answer)	FORMAL COURSE (Circle answer)
a. Principles and practices of radiation protection	SEE SUPPLEMENTS B AND D		Yes No	Yes No
b. Radioactivity measurement standardization and monitoring techniques and instruments			Yes No	Yes No
c. Mathematics and calculations basic to the use and measurement of radioactivity			Yes No	Yes No
d. Biological effects of radiation			Yes No	Yes No

9. EXPERIENCE WITH RADIATION. *(Actual use of radioisotopes or equivalent experience.)*

ISOTOPE	MAXIMUM AMOUNT	WHERE EXPERIENCE WAS GAINED	DURATION OF EXPERIENCE	TYPE OF USE
		SEE SUPPLEMENT B AND D		

10. RADIATION DETECTION INSTRUMENTS. *(Use supplemental sheets if necessary.)*

TYPE OF INSTRUMENTS (Include make and model number of each)	NUMBER AVAILABLE	RADIATION DETECTED	SENSITIVITY RANGE (mr/hr)	WINDOW THICKNESS (mg/cm²)	USE (Monitoring, surveying, measuring)
	SEE SUPPLEMENT C				

11. METHOD, FREQUENCY, AND STANDARDS USED IN CALIBRATING INSTRUMENTS LISTED ABOVE.

SEE CONTINUATION SHEET

12. FILM BADGES, DOSIMETERS, AND BIO-ASSAY PROCEDURES USED. *(For film badges, specify method of calibrating and processing, or name of supplier.)*

Film badges furnished by Lexington-Blue Grass Army Depot in accordance with SB 11-206 Pocket Chambers and Self-Reading Pocket Dosimeters furnished at the discretion of the HPO. SEE SUPPLEMENTS D AND E.

INFORMATION TO BE SUBMITTED ON ADDITIONAL SHEETS IN DUPLICATE

13. FACILITIES AND EQUIPMENT. Describe laboratory facilities and remote handling equipment, storage containers, shielding, fume hoods, etc. Explanatory sketch of facility is attached. *(Circle answer)* Yes (No) SEE SUPPLEMENT E

14. RADIATION PROTECTION PROGRAM. Describe the radiation protection program including control measures. If application covers sealed sources, submit leak testing procedures where applicable, name, training, and experience of person to perform leak tests, and arrangements for performing initial radiation survey, servicing, maintenance and repair of the source.

SEE SUPPLEMENTS A,D,E,F, AND H.

15. WASTE DISPOSAL. If a commercial waste disposal service is employed, specify name of company. Otherwise, submit detailed description of methods which will be used for disposing of radioactive wastes and estimates of the type and amount of activity involved.

In accordance with AR 755-15; also See Supplements D, G, and F.

CERTIFICATE (This item must be completed by applicant)

16. THE APPLICANT AND ANY OFFICIAL EXECUTING THIS CERTIFICATE ON BEHALF OF THE APPLICANT NAMED IN ITEM 1, CERTIFY THAT THIS APPLICATION IS PREPARED IN CONFORMITY WITH TITLE 10, CODE OF FEDERAL REGULATIONS, PART 30, AND THAT ALL INFORMATION CONTAINED HEREIN, INCLUDING ANY SUPPLEMENTS ATTACHED HERETO, IS TRUE AND CORRECT TO THE BEST OF OUR KNOWLEDGE AND BELIEF.

FOR THE COMMANDER:

Applicant named in item 1

Date 18 June 1974

By: Fred C. Brand

FRED C. BRAND, LTC, MSC

Adjutant

Title of certifying official

RECEIVED
1974 JUL 15 PM 1
U.S. ATOMIC ENERGY COM

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.

☆ U.S. GOVERNMENT PRINTING OFFICE : 1968 O—316-327

ONTINUATION SHEET - Form AEC-313

ITEM 1-B. 3. Fort Detrick, Maryland 21701
4. Fort Myer, Virginia 22208

ITEM 6.

D. Molybdenum 99	D. Molybdenum 99/Technetium 99m Generators (E.R. Squibb and Sons Model Nos. 08871 and 09650; Abbott Labs Model Nos. 7721 and 6724; NEN Pharmaceuticals Model No. NRP-196; Mallinckrodt Chemical Works Model Nos. 100 thru 106, 006 thru 012; Cambridge Nuclear Corp. Model No. CN-4291; and Amersham/Searle Corp. Model Nos. GTC-50, GTC-100, GTC-200, GTC-300, and GTC-400)	D. 10 Curies
E. Technetium 99m	E. Pertechnetate	E. 5 Curies
F. Neptunium 237	F. Any	F. 10 millicuries
G. Americium 241	G. Any	G. 100 microcuries
H. Polonium 210	H. Any	H. 15 millicuries
I. Cesium 137	I. Sealed Sources	I.
J. Cobalt 60	J. Sealed Sources	J.
K. Strontium 90	K. Sealed Sources in Gas Chromatograph Devices	K.
L. Cesium 137	L. Sealed Source	L.
M. Americium 241	M. Any	M.
N. Americium 241	N. Sealed Sources	N.

ITEM 11.

Radiation Survey Instruments are calibrated every three (3) months or as required.

a. Beta-gamma survey instruments are calibrated with a 137-Cesium Calibrator and a 60-Cobalt sealed source.

b. Alpha survey instruments are calibrated with an AN/UDM-6, or equal Alpha Calibration Set.

c. Neutron survey instruments are calibrated with a Neutron Source (Sealed Source).

for cont. sheets see supp' 50117

U. S. ATOMIC ENERGY COMMISSION

BYPRODUCT MATERIAL LICENSE

Amendment No. 45

Pursuant to the Atomic Energy Act of 1954 and Title 10, Code of Federal Regulations, Chapter 1, Parts 30, 32, 33, 34, and 35, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, own, possess, transfer and import byproduct material listed below; and to use such byproduct material for the purpose(s) and at the place(s) designated below. This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954, as amended, and is subject to all applicable rules, regulations, and orders of the Atomic Energy Commission now or hereafter in effect and to any conditions specified below.

Licensee	
1. Department of the Army Walter Reed Army Medical Center (WRAMC) 2. Washington, D. C. 20012	In accordance with application dated June 18, 1974, 3. License number 08-01738-02 is amended in its entirety to read as follows: 4. Expiration date August 31, 1979 5. Reference No.

6. Byproduct material (element and mass number)	7. Chemical and/or physical form	8. Maximum amount of radioactivity which licensee may possess at any one time
A. Any byproduct material with Atomic Nos. 3-83, inclusive	A. Any	A. 400 millicuries of each except: Iodine 131 2000 millicuries Xenon 133 5000 millicuries Krypton 85 5000 millicuries Gold 198 1000 millicuries Phosphorus 32 2000 millicuries Sulfur 35 1000 millicuries Carbon 14 2000 millicuries Iodine 125 1000 millicuries Iridium 192 [redacted] Total not to exceed 26 curies
B. Hydrogen 3	B. Any	B. 10,000 millicuries
C. Cesium 137	C. Sealed sources	C. [redacted]
D. Molybdenum 99	D. Molybdenum 99/ Technetium 99m Generators (E. R. Squibb and Sons Model Nos. 08871 and 09650; Abbott Labs. Model Nos. 7721 and 6724; NEN Pharmaceuticals Model No. NRP-196; Mallinckrodt Chemical Works Model Nos. 006 through 012 and 100 through 106; Cambridge Nuclear Corp. Model No. CN-4291; and Amersham/Searle Corp. Model Nos. GTC-50, GTC-100, GTC-200, GTC-300, and GTC-400)	D. 10 curies

Ex 2

Information in this record was deleted in accordance with the Freedom of Information Act, exemptions [redacted]
FOIA 2006-0238

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(6-72)

BYPRODUCT MATERIAL LICEN

Supplementary Sheet

Continued From Page 1

License Number 08-01738-02

Amendment No. 45

6. Byproduct material (element and mass number)	7. Chemical and/or physical form	8. Maximum amount of radio activity licensee may possess at any one time
E. Technetium 99m	E. Pertechnetate	E. 5 curies
F. Neptunium 237	F. Any	F. 10 millicuries
G. Americium 241	G. Any	G. 100 microcuries
H. Polonium 210	H. Any	H. 15 millicuries
I. Cesium 137	I. Sealed Sources	I.
J. Cobalt 60	J. Sealed Sources	J.
K. Strontium 90	K. Sealed Sources in Gas Chromatograph Devices	K.
L. Cesium 137	L. Sealed Source	L. 1 source of
M. Americium 241	M. Any	M.
N. Americium 241	N. Sealed Sources [redacted]	N.

9. Authorized use

A. through E. Medical research, diagnosis and therapy. Research and development as defined in Section 30.4(q), 10 CFR 30, "Rules of General Applicability to Licensing of Byproduct Material."

F. through K. Research and Development as defined in Section 30.4(q), 10 CFR Part 30, "Rules of General Applicability to Licensing of Byproduct Material."

L. For use in Calibration for calibration of instruments at the Health Physics Calibration Range, Walter Reed Army Medical Center.

M. For use as standards or reference sources.

N. Medical research.

CONDITIONS

10. Byproduct material shall be used only at Walter Reed Army Medical Center, Washington, D. C.; Forest Glen Section and Annex, Walter Reed Army Medical Center, Montgomery County, Maryland; Fort Detrick, Maryland; Fort Myer, Virginia; and Walter Reed Army Institute of Research Animal Holding Facility, Fort Meade, Maryland.

Ex 2

CONDITIONS

(Continued)

11. The licensee shall comply with the provisions of Title 10, Chapter 1, Code of Federal Regulations, Part 19, "Notices, Instructions and Reports to Workers; Inspections" and Part 20, "Standards for Protection Against Radiation."

12. A. Byproduct material shall be used by, or under the supervision of, individuals designated by the Walter Reed Army Medical Center Radioisotope Committee.

B. The use of byproduct material in or on humans shall be by a physician.

13. In lieu of using the conventional radiation caution colors (magenta or purple on yellow background) as provided in Section 20.203(a)(1), Title 10, Code of Federal Regulations, Part 20, the licensee is hereby authorized to label detector cells and cell baths, containing byproduct material and used in gas chromatography devices, with conspicuously etched or stamped radiation caution symbols without a color requirement.

14. Notwithstanding the labeling requirements of Section 20.203(f), 10 CFR Part 20, (or comparable Agreement State regulations) the licensee is authorized to receive, possess, and use byproduct material received under the American College of Pathologists Nuclear Medicine Quality Control Program with labeling as proposed in letter dated April 17, 1974.

15. Experimental animals administered radioactive materials or their products shall not be used for human consumption.

16. A. Except as otherwise specifically provided by this license, byproduct material to be administered to humans shall be procured in prepackaged, precalibrated form from a supplier who manufactures or repackages the product under appropriate pharmaceutical controls related to assay, identity, quality, purity, sterility, and nonpyrogenicity.

B. Byproduct material prepared by the licensee may be used in humans, provided the product is produced under pharmaceutical controls related to assay, identity, quality, purity, sterility, and nonpyrogenicity in accordance with application dated June 18, 1974.

17. Patients containing Cobalt 60, Iridium 192, and/or Cesium 137 implants shall remain hospitalized until the implants are removed.

18. Patients containing Iodine 131 for the treatment of thyroid carcinoma or patients containing therapeutic quantities of Gold 198 shall remain hospitalized until the residual activity is 30 millicuries or less.

(Continued)

19. A(1) Each sealed source acquired from another person and containing byproduct material, other than Hydrogen 3, with a half-life greater than thirty days and in any form other than gas shall be tested for contamination and/or leakage prior to use. In the absence of a certificate from a transferor indicating that a test has been made within six months prior to the transfer, the sealed source shall not be put into use until tested.

(2) Notwithstanding the periodic leak test required by this condition, any licensed sealed source is exempt from such leak tests when the source contains 100 microcuries or less of beta and/or gamma emitting material or 10 microcuries or less of alpha emitting material.

(3) Except for alpha sources, the periodic leak test required by this condition does not apply to sealed sources that are stored and not being used. The sources excepted from this test shall be tested for leakage prior to any use or transfer to another person unless they have been leak tested within six months prior to the date of use or transfer.

B. Each sealed source fabricated by the licensee shall be inspected and tested for construction defects, leakage, and contamination prior to use or transfer as a sealed source. If the inspection or test reveals any contamination defects or 0.005 microcurie or greater of contamination, the source shall not be used or transferred as a sealed source until it has been repaired, decontaminated, and retested.

C. Each sealed source containing byproduct material, other than Hydrogen 3, with a half-life greater than thirty days and in any form other than gas shall be tested for leakage and/or contamination at intervals not to exceed six months except that each source designed for the purpose of emitting alpha particles shall be tested at intervals not to exceed three months.

D. The test shall be capable of detecting the presence of 0.005 microcurie of radioactive material on the test sample. The test sample shall be taken from the sealed source or from the surfaces of the device in which the sealed source is permanently or semipermanently mounted or stored on which one might expect contamination to accumulate. Records of leak test results shall be kept in units of microcuries and maintained for inspection by the Commission.

CONDITIONS

19. continued

N. If the test required by Subsection A. or C. of this condition reveals the presence of 0.005 microcurie or more of removable contamination, the licensee shall immediately withdraw the sealed source from use and shall cause it to be decontaminated and repaired or to be disposed of in accordance with Commission regulations. A report shall be filed within 5 days of the test with the USAEC, Region I, Directorate of Regulatory Operations, 631 Park Avenue, King of Prussia, Pennsylvania 19406, describing the equipment involved, the test results, and the corrective action taken.

20. Biological products labeled with radionuclides or kits used to prepare such products shall be procured from a supplier who holds an unsuspended or unrevoked license issued by the Secretary of the Department of Health, Education, and Welfare to propagate, manufacture, prepare, label, or distribute the products. The labeled biological products shall be used only for the medical indications covered by the supplier's Department of Health, Education, and Welfare license.

21. The licensee shall elute technetium 99m pertechnetate from molybdenum 99/technetium 99m generators and/or prepare radiopharmaceuticals from reagent kits in accordance with:

(A) The manufacturer's specifications contained in the package insert; and

(B) Statements, representations, and procedures contained in application dated June 18, 1974.

22. Radioactive gases as free gas or in solution, to be administered to humans, shall be procured from a supplier who distributes the product indicated for human use in accordance with the Federal Food, Drug and Cosmetic Act.

23. Except as specifically provided otherwise by this license, the licensee shall possess and use byproduct material described in Items 6, 7, and 8 of this license in accordance with statements, representations, and procedures contained in application dated June 18, 1974, letter received August 14, 1974, and bioassay procedures dated October 25, 1974, signed by Lt. Col. Edward W. Blackburn.

For the U. S. Atomic Energy Commission

Date DEC 11 1974

12/11/74

by _____
Materials Branch
Directorate of Licensing
Washington, D. C. 20545

12-11-74

DEPARTMENT OF THE ARMY
OFFICE OF THE SURGEON GENERAL
WASHINGTON, D.C. 20310

REPLY TO
ATTENTION OF:

DASG-HCH-E

28 March 1978

Leo Wade, Ph.D.
Materials Branch
Directorate of Licensing
Nuclear Regulatory Commission
Washington, DC 20555

Dear Doctor Wade:

Recommend approval of the inclosed application for amendment to NRC License Number 08-01738-02 for Walter Reed Army Medical Center, Washington, DC 20012.

Sincerely,

VANDY L. Miller
Colonel, MSC
Radiological Hygiene Consultant

1 Incl
as (in trip)

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INSPECTION AND ENFORCEMENT

Information in this record was deleted
in accordance with the Freedom of Information
Act, exemptions 2
FOIA 2006-0238

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93828
File Exempt.

DEPARTMENT OF THE ARMY
WALTER REED ARMY MEDICAL CENTER
WASHINGTON, D.C. 20012

REPLY TO
ATTENTION OF:

HSWP-QHP

6 March 1978

SUBJECT: Amendment to USNRC License 08-01738-02

THRU: Commander
US Army Health Services Command
ATTN: HSPA-H
Fort Sam Houston, TX 78234

HQDA (DASG-HCH-E)
WASH DC 20310

TO: Chief
Radioisotope Licensing Branch
Division of Fuel Cycle and Material Safety
US Nuclear Regulatory Commission
Washington, D.C. 20555

1. Request that Condition 10 of USNRC License 08-01738-02 be amended to include the US Army Institute of Dental Research facility at Fort George C. Meade, Anne Arundel County, Maryland 20755.

2. Request that Item 8A of USNRC License 08-01738-02 be amended to add: Chromium-51; Possession Limit - 750 millicuries.

JUSTIFICATION: Current trends indicate an increase in the use of Chromium-51 for animal research by the Walter read Army Institute of Research and for in-vitro immunological studies by the Clinical Investigation Service, Walter Reed Army Medical Center.

3. Request that Items 6, 7 and 8 of USNRC License 08-01738-02 be amended to include:

0. Iodine-125	0. Sealed Source (Norland Inst Co. Model #178A591A. 2 Sources of 200 mCi each)	0. 400 millicuries

HSWP-QHP 6 March 1978
SUBJECT: Amendment to USNRC License 08-01738-02

JUSTIFICATION: Walter Reed Army Medical Center recently purchased a Model 178 Norland-Cameron Bone Mineral Analyzer. The Iodine-125 sealed sources are components of this analyzer. Sources will be handled in accordance with manufacturer's instructions attached at Inclosure 1.

4. Request that the instructions implementing the provisions of 10 CFR 21 attached at Inclosure 2 be included in the supporting documentation of USNRC License 08-01738-02.

5. Request that HSWP-QHP SOP Number 1-9, Requirements for the Use of Radioactive Iodine, dated 28 Feb 78, attached at Inclosure 3, be included in the supporting documentation of USNRC License 08-01738-02.

6. Request that the following updated supporting documentation be posted to USNRC License 08-01738-02. Revised documents are attached at Inclosures 4 through 15.

a. HSWP-QHP MEMO Number 9, Laboratory Facilities, dated 19 Sep 77.

b. USAMRIID MEMO Number 40-11, Health Physics Regulation, dated 23 Mar 76.

c. HSWP-QHP SOP Number 1-6, Leak Testing and Inventory of Sealed Sources, dated 3 Nov 77.

d. HSWP-QHP SOP Number 1-2, Counting Procedures, dated 12 Sep 77.

e. HSW-YHP SOP Number 2-2, Radioactivity Analysis Laboratory, dated 7 Feb 77.

f. HSWP-QHP MEMO Number 14, Gas Chromatograph Operating Procedures, dated 28 Feb 78.

g. HSWP-QHP SOP Number 4-2, Receipt of Radioactive Material Shipments During Non-Duty Hours, dated 31 Oct 77.

h. HSW-YHP SOP Number 2-5, Health Physics Calibration Range, dated 17 Jan 77.

i. Technical Procedure Number NM-1, Assay of 99-Mo Contamination, dated 3 Jan 78.

j. Technical Procedure Number NM-2, Radiopharmaceutical Testing and Quality Control, dated 3 Jan 78.

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HSWP-QHP 6 March 1978
SUBJECT: Amendment to USNRC License 08-01738-02

k. Technical Procedure Number NM-3, Technical Procedures for Radiation Detection, dated 3 Jan 78.

l. Technical Procedure Number NM-4, Technical Procedures for Dose Calibrator, dated 3 Jan 78.

7. Any questions or comments pertaining to this request should be directed to the Health Physics Officer, Walter Reed Army Medical Center, Washington, D.C. 20012 (Telephone: Commercial - 202-427-5161; Autovon - 291-5161; IDS Code - 198-5161).

FOR THE COMMANDER:

Ronald G. Newman

15 Incl
as

RONALD G. NEWMAN
LTC, MSC
Adjutant

SOURCE INSTALLATION

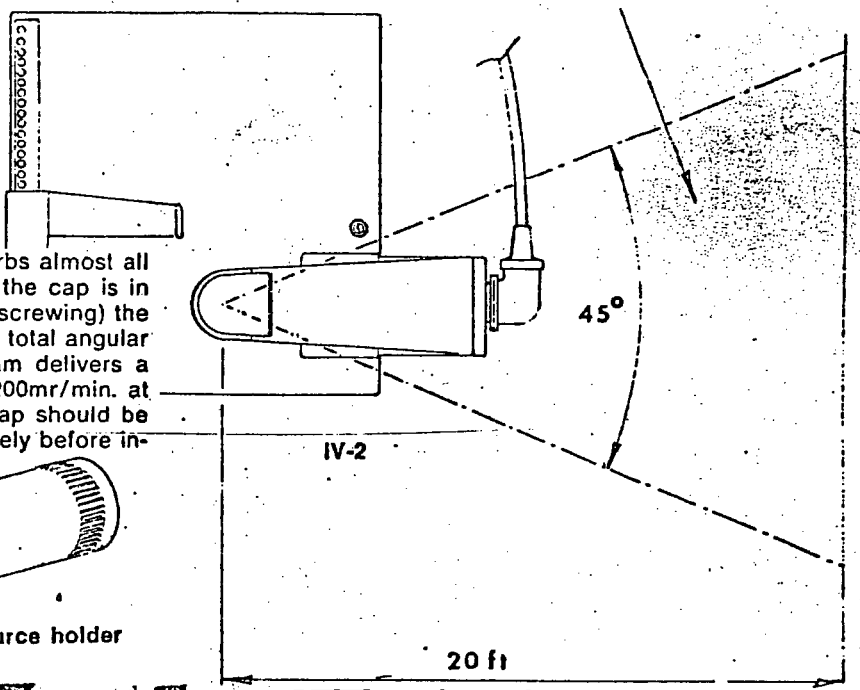
To install the source in the machine proceed as follows: Turn off the power. Remove the thumb screws holding the limb holder and deck to the scanner base (two in front and one in back). Using the deck key unlock the deck from the base. This lock is a screw type. Turn it counter-clockwise several turns until the deck is free. Disconnect the cable from the back of the scanner and then lift the stainless steel deck. Be sure that no persons are in the area indicated by the diagram in figure IV-2. Lift the source holder arm as shown in figure IV-3. Holding the source in the position illustrated in figure IV-4 remove the source holder cap and proceed with installation of the source as demonstrated in figure IV-5. Lower the source holder arm back into the carriage assembly and screw the source holder cap onto the stud provided on the carriage assembly (figure IV-6) to store it for later use. KEEP FINGERS AWAY FROM THE EXPOSED END OF THE SOURCE HOLDER AT ALL TIMES AND DO NOT POINT THE EXPOSED SOURCE TOWARD ANYONE.

When removing the source from the machine reverse the above sequence. Be sure to replace the cap on the source holder before transporting the source anywhere.

DANGER

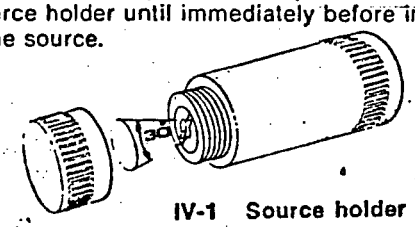
THERE SHALL BE NO PERSONS IN THIS AREA

WHILE A SOURCE IS BEING LOADED INTO THE INSTRUMENT

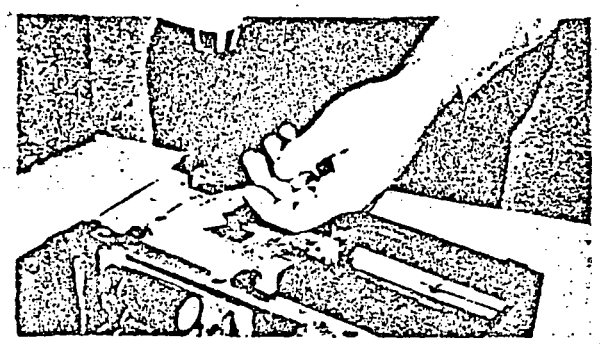


IV-2

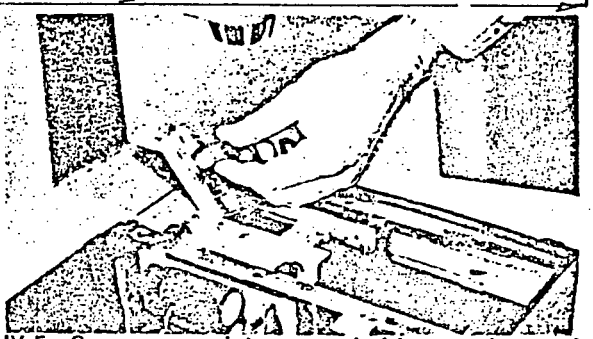
The source holder (figure IV-1) absorbs almost all of the radiation from the source when the cap is in place. When the cap is removed (by unscrewing) the beam exits from the exposed end with a total angular spread of approximately 30°. The beam delivers a maximum dose rate of approximately 200mr/min. at a distance of 2.5 cm. The protective cap should be left on the source holder until immediately before installation of the source.



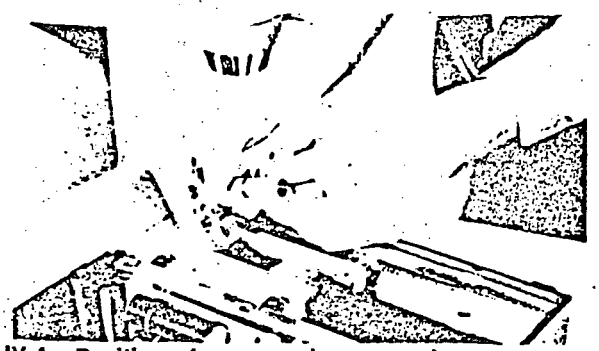
IV-1 Source holder



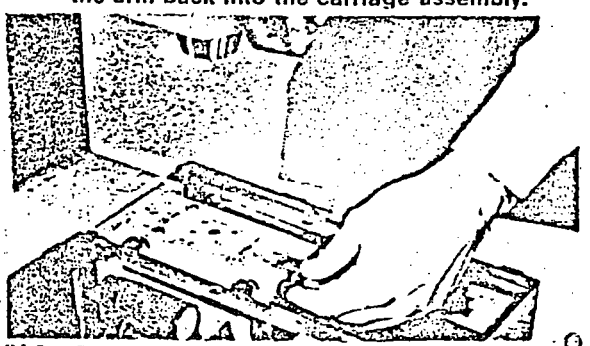
IV-3 Lift source holder arm



IV-5 Screw source into source holder arm then push the arm back into the carriage assembly.



IV-4 Position of source when removing cap



IV-6 Secure source cap for later use

93828

NORLAND INSTRUMENTS
A Subsidiary of Cordis Corporation
Norland Drive, Route 4, Fort Atkinson, Wisconsin 53538 U.S.A.

INFORMATION REGARDING RETURN OF SOURCES

It is a United States Nuclear Regulatory Commission regulation that sealed radioactive sources such as this one be leak-tested at least every six months and detailed records kept of the results.

However, since iodine-125 sources are normally used for only four months, they are ready for disposal before the first leak test comes due. Norland Instruments provides a free service of leak-testing and disposal for customers' depleted sources returned to the factory. Detailed instructions for return accompany each source.

If it is desired to do so, sources may be kept beyond the six month return date; in this case the responsibility for leak-testing, record keeping, and ultimate disposal rests with the user.

****

Es ist von jetzt ab nicht mehr notwendig, abgereicherte Quelle und Quellenbehälter zur Beseitigung an Norland zurückzuschicker Norland wird die Beseitigung kostenlos übernehmen, vorausgesetzt dass alle Fracht-, Versicherungs - und Zollkosten an Norland vorausgezahlt werden.

****

Vous n'êtes plus tenu de renvoyer à la Compagnie Norland la source radioactive périmée ni le porte-source pour qu'elle en dispose. Norland fournira ce service gratuitement, mais tous frais de transport, d'assurance et de douane devront être payés d'avance à Norland.

****

Ya no es necesario que devuelva a Norland la fuente agotada y el sostén de la fuente para su desecho. Norland proporciona un servicio de desecho sin cargo alguno, pero los gastos de carga, seguro y servicios de aduana deben pagarse a Norland de antemano.

NORLAND INSTRUMENTS
A Subsidiary of Cordis Corporation
Norland Drive, Route 4, Fort Atkinson, Wisconsin 53538 U.S.A.

INSTRUCTIONS FOR SHIPMENT OF DEPLETED SOURCE TO NORLAND INSTRUMENTS FOR DISPOSAL

1.) Inspect the package and judge whether it can still meet the following Department of Transportation tests without degrading its functional security.

   a.) 30 minute continuous water spray test
   b.) 4 foot free drop onto unyielding surface
   c.) 1 foot drop onto each corner
   d.) impact of 1-1/4 inch diameter rod weighing 13 lbs. from a height of 40 inches
   e.) 30 lb. weight placed on top of container for 24 hours

   If, in your judgment, the package and its internal cushioning are still capable of meeting the above specifications, proceed according to instruction 2. If, in your judgment, the package is damaged to the point that it cannot meet the above criteria, notify us to send a new one to you.

2.) Place the old source in the package and pack with the cushioning material in the manner that the new source was received.

3.) Close the package and secure with the paper tape provided. Apply the Radioactive White I labels over the Radioactive Yellow II labels printed on the box. (Sources which are 120 days old have a low external radiation dose rate and qualify for White I labeling). Apply the return shipping label supplied.

4.) Ship the package by whatever means is convenient. Regulations require that you furnish the carrier with a Certification for Restricted Articles. You may use the form enclosed. The information to be included on the Certification is as follows:

   TRANSPORT GROUP - III
   NUCLIDE - Iodine - 125
   FORM - normal - sealed source of ^{125}I on resin
   ACTIVITY - 50 mCi
   LABEL ON PACKAGE - Radioactive White I
   PACKAGE TYPE - A
   TRANSPORT INDEX - Zero

NOTICE: SHIP PREPAID; NORLAND WILL NOT ACCEPT SOURCES RETURNED COLLE

DISPOSITION FORM

For use of this form, see AR 340-15; the proponent agency is The Adjutant General's Office.

REFERENCE OR OFFICE SYMBOL	SUBJECT
HSWP-QHP	Compliance with 10 CFR 21

TO All Principal Users
WRAMC

FROM Health Physics Office
WRAMC

DATE 24 Feb 78

CMT 1

SFC Harmon/acp/75268

1. Pending complete revision of Walter Reed Regulation 40-10 which is expected to be completed in early spring, CY 1978, the following provisions for reporting requirements under Title 10, Code of Federal Regulations, Part 21, will apply. It is the responsibility of each Principal User of WRAMC Radioactive Material Authorizations to disseminate this information to the Co-Workers, Trainees and Technicians listed on the Authorization as well as other individuals who may be working in the vicinity.

2. The procedures for reporting defects or items of Non-Compliance is intended to implement methods for early detection, evaluation, correction and reporting of such defects and items of Non-Compliance which could result in a significant safety hazard. The definition of all terms relevant to this section are contained in Title 10, Code of Federal Regulations, Part 21.3.

a. All alleged defects or items of Non-Compliance SHALL be brought to the attention of the appropriate Principal User who will in turn notify the Health Physics Officer.

b. The Health Physics Officer SHALL initiate an investigation of the alleged defect or item of Non-Compliance within one (1) duty day after he receives information pertaining to the defect or Non-Compliance. The Health Physics Officer SHALL take immediate corrective action, if warranted.

c. The Health Physics Officer SHALL report the alleged defect or Non-Compliance along with an evaluation and recommendation to the Chairperson, WRAMC Radioisotope Committee, upon termination of the investigation.

d. Upon a determination by the Chairperson, WRAMC Radioisotope Committee, that the defect or item of Non-Compliance either exists or did exist and that said defect or item of Non-Compliance either constitutes or did constitute a significant safety hazard, the Chairperson of the committee SHALL inform the Commander, WRAMC, of the defect or non-compliance and also the provisions of Title 10, Code of Federal Regulations, Part21 for reporting such items to the US Nuclear Regulatory Commission as appropriate.

e. At the direction of the Commander, WRAMC, the Health Physics Officer SHALL notify the US Nuclear Regulatory Commission in accordance with Title 10, Code of Federal Regulations, Part 21.21.

f. The Health Physics Officer SHALL maintain records as required by Title 10, Code of Federal Regulations, Part 21.51.

3. Any comments, questions or recommendations concerning the above procedures should be directed to the Health Physics Officer, Telephone: 427-5161 or 427-5268.

BOBBY R. ADCOCK, LTC, MSC
Health Physics Officer

93828

Incl 2

HEALTH PHYSICS
WALTER REED ARMY MEDICAL CENTER
Washington, D.C. 20012

HSWP-QHP
SOP Number 1-9

28 February 1978

REQUIREMENTS FOR THE USE OF RADIOACTIVE IODINE

1. PURPOSE. To establish the requirements for utilizing quantities of Radioactive Iodine-125 and/or -131 in amounts of 1.0 mCi or greater within the Walter Reed Army Medical Center and tenant units supported by the Health Physics Office, WRAMC.

2. METHODS AND PROCEDURES.

a. In view of the diffusion capability of Iodine, all personnel performing procedures involving radioactive iodine must wear appropriate protective clothing and assigned pesonnel dosimetric devices. Radioactive iodine will diffuse rapidly through both plastic and rubber gloves; therefore, personnel handling radioactive iodine should change their gloves frequently.

b. All laboratory facilities authorized to utilize radioactive iodine will be equipped with a suitable survey meter. These meters will be calibrated in accordance with current directives by the Health Physics Instrument Calibration Facility. The individual user is responsible for conducting a thorough meter survey of his facility upon completion of any procedure involving radioactive iodine.

c. All procedures involving the use of 5.0 mCi or more of radioactive iodine will be accomplished utilizing an Iodination Box, Model RM-1, or an approved equivalent. In the case of therapeutic usage of radioactive iodine, the vial will be vented inside the approved iodination box prior to being transported to the patient care area.

d. Procedures involving the use of radioactive iodine in amounts less than 5.0 mCi, will be accomplished in properly ventilated hoods as approved by the Health Physics Officer.

e. In view of the extensive preparation requirements surrounding the use of radioactive Iodine-131 involving in-patients, the Nuclear Medicine Clinic will coordinate with the Health Physics Office at least 24 hours in advance of a scheduled treatment.

3. MONITORING. In accordance with the current limits on the release of radioactive iodine to both individuals and the general environment, the following monitoring will be accomplished when utilizing quantities of 5.0 mCi or more.

a. Breathing Zone. A sample of the air in the vicinity of the user's mouth and nose will be drawn through a charcoal filter at a rate of 10 Liters per Minute (LPM). The sample will be collected for a period of time that will encompass the total time that the user is performing procedures involving radioactive iodine. The individual user is responsible for

Incl 31

collecting the sample and causing it to be delivered to the Radioactivity Analysis Laboratory (RAL), Health Physics. The sample will be secured in a suitable container to prevent possible contamination. The user will provide the date and time that the sample was collected to allow proper processing by the RAL.

b. Room Air. A sample of the air which is representative of the air within the room containing the iodination hood will be drawn through a charcoal filter at a rate of 10 LPM. The sample will be collected continuously for a period of one week. The Reactor and Survey Branch (R&S Br), Health Physics Office will be responsible for changing the filter and forwarding it to the RAL for processing.

c. Environment. A sample of the air being discharged to the environment will be collected at a point downstream from the last charcoal impregnated filtration device in the ventilation system. The R&S Br, Health Physics Office is responsible for changing this filter and forwarding it to the RAL for processing. The sample will be collected continuously for a period of one month.

d. Filters. In all cases where in-house vacuum is chosen for sample collection, in lieu of a vacuum pump, an additional charcoal impregnated filter will be installed between vacuum source and the filter used for the sample collection. The Health Physics Office will supply all filters necessary for collection of the required samples. The self contained charcoal impregnated filter in the Model RM-1 Iodination Box will be changed as directed by the Health Physics Officer. Procurement of these filters is the responsibility of the individual user. It is recommended that each user maintain a replacement filter available to prevent interruption of his procedures when replacement is required.

4. Any other procedures involving the use of radioactive iodine, not specifically covered by the above, will be coordinated with the Health Physics Office.

BOBBY R. ADCOCK
LTC, MSC
Health Physics Officer

HEALTH PHYSICS
WALTER REED ARMY MEDICAL CENTER
Washington, D.C. 20012

HSWP-QHP
*MEMO
NO. 9

19 September 1977

LABORATORY FACILITIES (Radioactive Materials)

1. General. Walter Reed Army Medical Center performs a great deal of research and development as well as routine and innovative medical treatment. The units engaged in these activities maintain adequate, safe laboratories to support these endeavors. The use of radioactive material in a laboratory presents special problems and may require unique facilities to control potential health hazards.

2. Responsibilities.

a. The Principal User for a Radioactive Material Use Authorization is responsible to provide proper laboratory facilities and equipment necessary for the safe handling, storage and use of all radioactive material for his project and to insure that proper laboratory procedures and applicable regulations are followed to protect personnel from hazards involved in the use of this material.

b. Each Principal User must submit a description of proposed uses, procedures, and facilities available in sufficient detail so that Health Physics may evaluate the radiation hazards involved. The Principal User must keep Health Physics informed of changes in procedures and facilities so that re-evaluations can be made, as necessary.

c. Health Physics will evaluate such procedures and facilities and advise the principal user as to the adequacy of the facilities. Assistance in designing laboratories, storage facilities and procedures for use of radioactive materials will be provided as required.

3. Equipment Available for Temporary Loan from Health Physics.

a. Remote Handling. Several varieties of niptongs and griptongs, Atomic Accessories Remote Handling Tool Model RHT-60, assorted jaws and vices, remote forceps and magnetic handlers.

b. Storage Containers. Several varieties of portable lead storage containers, steel safes, lead-lined boxes, steel drums for radioactive waste.

* This MEMO supersedes HP MEMO NO. 9, Title as above, 29 July 1969

Incl 4

c. Shielding. A limited supply of shielding material.

4. Instrumentation Available for Temporary Loan from Health Physics. See HP MEMO No. 10 - Radiation Detection Instruments.

5. Ventilation Control.

a. A fume hood of acceptable design must be available in the laboratory intended for the use of radioactive material when such a device is prescribed by the Health Physics Officer. Health Physics will perform all necessary inspections and surveys of fume hoods intended for the use of radioactive material; these will include the following:

(1) Measuring the pressure differential.

(2) Measuring the flow rate.

(3) Measuring the integrity of absolute filter installations when provided.

(4) Any other test as directed by the Health Physics Officer after a review of the intended use of the facility.

b. Fume hoods with absolute filter assemblies, and glove boxes may be made available for temporary use upon request to Health Physics. If use of these facilities is determined to be necessary, co-ordination will be provided by Health Physics.

BOBBY R. ADCOCK
LTC, MSC
Health Physics Officer

608-01

DEPARTMENT OF THE ARMY
HEADQUARTERS, U.S. ARMY MEDICAL RESEARCH INSTITUTE OF INFECTIOUS DISEASES
FORT DETRICK, FREDERICK, MARYLAND 21701

MEMORANDUM
NUMBER 40-11*

23 March 1976

MEDICAL SERVICE

HEALTH PHYSICS REGULATION FOR RADIOISOTOPE UTILIZATION

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1. PURPOSE.

To establish policy and procedure for radioisotope utilization at USAMRIID. This memorandum supplements Walter Reed Army Medical (WRAMC) Regulation 40-10 (WR 40-10) dated 17 Jun 74 governing the radiological safety program for the use of material or equipment that produces ionizing radiation. USAMRIID personnel utilize radioisotopes in accordance with WRAMC Authorization #506A and WR 40-10 as implemented by this memorandum.

2. RESPONSIBILITIES.

a. Principal User - Scientific Advisor, USAMRIID.

(1) The single senior individual at USAMRIID who serves as the Principal User of isotopes for the entire Institute in accordance with WRAMC Authorization Number 506A. In his absence, Principal User functions are filled by a designated deputy, the Senior Biochemist, USAMRIID.

*This Memorandum supersedes USAMRIID Memo 40-11, dated 26 Mar 75.
NOTE: Changes to previous memo are indicated by asterisks (*) preceding changed material.

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3. LICENSES.

*a. Isotope utilization at USAMRIID is conducted under the provisions of WRAMC's Nuclear Regulatory Commission (NRC) Biproduct Material License Number 08-01738-02, and is specifically approved by the WRAMC Radioisotope Committee Authorization Number 506A (for non-human use) which is updated annually.

b. The model [redacted] CO-60 Irradiation Unit located in Suite [redacted] Bldg [redacted] is approved under WRAMC license 08-01738-05.

4. RADIATION EQUIPMENT UTILIZATION.

Model [redacted] CO-60 Irradiation Unit and the 1MEV Therapy X-ray unit: Use of these instruments is limited to trained personnel operating under the overall supervision of Chief, Animal Assessment Division.

5. ISOTOPE WASTE DISPOSAL PROCEDURE.

a. The disposal of radioactive waste is accomplished by the Health Physics NCOIC in accordance with established WRAMC procedures, Safety Division, Fort Detrick regulations, and USAMRIID Safety Memorandum No. 385-3.

b. Disposal of radioactive waste by co-users: See Appendices B and C.

c. Isotope waste is normally transferred from USAMRIID collection areas on scheduled days by the Health Physics NCOIC, however, additional or special disposal problems are referred to the Health Physics NCOIC whenever they arise.

d. Co-users are responsible for providing the Health Physics NCOIC an accurate estimate of the amount of radioactive material by type in each waste container. The Health Physics NCOIC must report this information to the Chief of the Safety Divsion, Fort Detrick at the time waste containers are transferred to him for disposal.

e. Animal carcass waste is kept separate from all other types.

6. PROCEDURE FOR REMOVAL OF RADIOACTIVE CARCASSES FROM INFECTIOUS SUITES.

See Appendix C.

7. FIRE DEPARTMENT RESPONSIBILITIES.

The procedures specified in WRAMC Reg. 40-10, Annex V, Health Physics Aspects of Fire Fighting, apply to the Fort Detrick Fire Department. In case of fire, additional notification must be given to the USAMRIID Health Physics Technician or Principal User.

APPENDIX A

TABLE OF MAXIMUM INVENTORY OF RADIOACTIVE MATERIALS
(WRAMC AUTHORIZATION 506A)
As of 23 Mar 76

Item	Maximum Inventory Authorized
*3 H(Tritium)	550mCi
14 C(Carbon)	60mCi
32 P(Phosphorous)	200mCi
35 S(Sulfur)	20mCi
42 K(Potassium)	50mCi
45 Ca(Calcium)	20mCi
47 Ca(Calcium)	1mCi
51 Cr(Chromium)	20mCi
*59 Fe(Iron)	10mCi
65 Z(Zinc)	50mCi
*67 Ga(Gallium)	10mCi
85 Sr(Stronium)	10mCi
86 Rb(Rubidium)	50mCi
125 I(Iodine)	100mCi
131 I(Iodine)	100mCi
169 Yb(Ytterbrium)	10mCi
198 Au(Gold)	35mCi
232 Th(Thorium)	1 lb.
238 U(Uranium)	1 lb.

APPENDIX B

SUBJECT: Disposal of Radioactive Waste by Co-User.

1. Radioactive waste will not be disposed of through other than an approved means; all isotopes acquired by co-workers must be accounted for in toto, and all waste disposal must be accomplished in coordination with the USAMRIID Health Physics NCOIC. Discarding radioactive materials in sinks is not an approved disposal method for isotope co-users.

2. The isotope co-user will provide the USAMRIID Health Physics NCOIC a complete recording of the isotope contents of each radioactive waste disposition. The following information will be included on the tag attached to each bag of solid waste.

a. The name of the co-user responsible for the isotope(s) being used. This is the person charged for the isotope(s) in the health physics records.

b. The isotope(s) contained in the waste disposition.

c. An estimate of the total activity for each isotope contained in the package of waste. This estimate must be in millicuries or in microcuries; DPM or CPM will not be acceptable.

d. The date of the entry.

e. The type of waste, as explained in item 5 below.

3. The Health Physics Technicians will pick up the waste from the individual laboratories. The times of pick up will be coordinated with each investigator.

4. Except for the packaging of radioactive carcasses, only magenta colored plastic bags will be used for packaging radioactive waste. These bags should be sealed at the top and properly labeled. If there is danger of the bag tearing or being damaged by the contents, multiple bags should be used.

5. Radioactive waste must be packaged by the co-user according to the following classification and given to the Health Physics Technician(s).

a. Burnable solid waste: Waste products including paper, plastic, rubber, and other solid burnable materials.

b. Non-burnable solid waste: Glass and metal waste.

c. Bulk liquid waste: Liquids in large quantities. Keep isotopes separated as much as possible.

d. Flammable liquid waste: This consists of scintillation vials which contain flammable scintillation fluid. Test tubes or vials from gamma counters may be placed in non-burnable solid waste unless they contain flammable liquids.

e. Animal carcasses: This category includes serum or tissues which would decay if kept unfrozen.

APPENDIX C

SUBJECT: Procedure for Removal of Radioactive Carcasses from Infectious Suites

1. Carcasses of an individual monkey or groups of small animals are placed in 20" x 30" Chieftain nylon bags (an American Hospital Supply product). The bag is sealed by tightly rolling the open end and applying autoclave tape. Only this specific type of nylon bag should be used to prevent bag destruction by autoclave heat. This nylon bag is placed in a waterproof paper bag (Stock No. 8105-001-3245) and then placed in a hat box. The box is marked "Radioactive Waste" in pencil, and the contents of the box identified as outlined in Appendix B.

2. Multiple monkey carcasses may be removed simultaneously by an alternative method. Monkey carcasses may be placed in a 55-gallon barrel and permitted to accumulate until the barrel is 2/3 full. Wood shavings must be added periodically to absorb moisture duting autoclaving. The barrel must be labeled as containing radioactive waste. The monkey number, date, and amount of radiation given to each is entered on a card on the barrel lid; the barrel is then kept in the walk-in cooler until ready to be autoclaved.

3. The box or barrel is placed in the exit-autoclave of the suite with its lid off and autoclaved on "dry" cycle. A one hour sterilizing time is used.

4. The Health Physics NCOIC should be notified both 24 hours prior to the time that waste is passed through the autoclave and at the time it is to be picked up.

5. At the time of pick up, the Health Physics Technician will seal and properly relabel the container as radioactive and check to insure that the complete description of radioactive material within the container is listed on its lid.

6. In the event that the Health Physics Technician is not immediately available to remove the sterilized container, it will be retained within the suite, stored in the cold room, and steps 3, 4 and 5 above will be repeated.

APPENDIX D

SUBJECT: USAMRIID Procedures for Ordering Radioactive Materials

1. Ordering.

a. A request for purchase of radioisotopes will be submitted by co-user to the secretary of the Physical Sciences Division who will prepare five copies of Request for Issue or Turn-in (DA 3161) for each request for radioactive materials. Each request must be cleared through the alternate principle user and the Scientific Advisor. In the absence of the Scientific Advisor, the next senior member of the USAMRIID Isotope Committee may sign the request. The request will then be forwarded to the Medical Supply Office. Before the order is placed, the approval of Health Physics is obtained to assure compliance with license.

b. Distribution of DA 3161 is as follows:

(1) Original and 1 copy - retained by Medical Supply Officer.

(2) 1 copy - to Health Physics Officer, (WRAMC).

(3) 1 copy - to Health Physics Technician, (USAMRIID).

(4) 1 copy - to Physical Sciences Division.

2. Charge Account Sources for radioactive materials are as follows:

a. Abbott Laboratories.

b. Amersham/Searle.

c. Cambridge Nuclear Corporation.

d. Curtis Nuclear Corporation.

e. International Chemical & Nuclear Corporation.

f. Mallinckrodt/Nuclear Coporation.

g. New England Nuclear.

h. Schwarz/Mann.

i. E.R. Squibb & Sons.

*3. Requests costing less than $500:

*a. Requests costing less than $500 will be ordered by the Blanket Purchase Agreement (BPA) Ordering Officer, USAMRIID, provided the requested source is on Charge Account and approval is obtained through Health Physics

Technician and the BPA Ordering Officer, USAMRIID. Approval will normally be granted when the requests are within the allowances set forth by the AEC License Number and USAMRIID maximum authorized inventory quantity.

b. Three weeks should be allowed for delivery of materials from the time the request is initiated. Delivery time is contingent upon availability of item(s) at the requested source.

*4. Requests costing $500 or more:

*a. Requests in excess of $500 must be forwarded to the Medical Supply Office, USAMRIID, for processing through Finance & Accounting, Logistics Division, and Material Branch, WRAMC.

b. Four weeks should be allowed for delivery of materials from the time the request is initiated. Delivery time is contingent upon availability of item(s) at the requested source.

5. Receipt of Radioactive Material.

a. During normal duty hours:

Upon receipt of radioactive material by personnel of the Medical Supply Office, a call will be placed to the Health Physics NCOIC, USAMRIID, notifying him of the receipt. The Health Physics Technician, NCOIC, or assistant NCOIC, Physical Sciences Division will pick up the shipment at the Medical Supply Office and verify the order and record its receipt in the Health Physics Log Book.

b. After normal duty hours:

(1) If received on post after normal duty hours, radioactive isotopes will be delivered to the CQ (Phase 1) by the Post Transportation Officer or other delivery agent.

(2) The CQ will inspect the package and sign receipts if required. Damage to any containers must be fully documented.

(3) The CQ will then read the storage instructions on the container, and store in accordance with Appendix B, Surveillance Technicians Instruction Book.

(4) Receipt and disposition of all radioactive material will be noted in the CQ report. If additional information or assistance is required the CQ will consult emergency procedures on file.

6. Actions to be taken after Receipt:

a. Correct shipment:

If the shipment is correct, the packing list and/or invoice will be forwarded to the BPA Ordering Officer, USAMRIID. The purchase requisition

will then be sent to the NCOIC, Physical Sciences Division, or his assistant, for signature. The Health Physics NCOIC, USAMRIID, will then notify the Health Physics Officer, WRAMC, of the completed action.

b. Incorrect shipment:

If the shipment is incorrect, the individual checking the shipment should contact the BPA Ordering Officer, USAMRIID, who will in turn notify the Health Physics Officer, WRAMC, of the discrepancy. No action will be taken on the shipment until specific instructions have been received from the Health Physics Officer, WRAMC. If the shipment is to be returned, the shipping will be coordinated between the Transportation Officer, Fort Detrick Medical Supply Sergeant, and the Health Physics Technician, USAMRIID.

7. Authorized Allowance for Radioactive Materials.

Requests for radioactive materials will not exceed authorized allowances set forth by WRAMC Regulation 40-10 and WRAMC Authorization 506A (See Appendix A).

8. Transportation of Radioactive Material during Non-Duty Hours.

a. If notification is received during non-duty hours that a radioactive shipment must be picked up immediately, the Phase II CQ will be notified and given complete shipment information. This information should include:

(1) Airbill number.

(2) Name of airline.

(3) Name of shipper.

(4) Name of addressee.

(5) Flight number.

(6) Where to pick up shipment.

(7) Size of shipment.

b. The Phase II CQ will follow normal procedures for notification of the USAMRIID driver, and for dispatching a vehicle. The duty driver will report to the Phase II CQ and obtain all necessary shipment information. He will also obtain the radioactive packet located in the USAMRIID Headquarters Distribution Center. Instructions contained in this packet will be followed precisely. The driver will then proceed to the point of pick-up.

c. On return to USAMRIID, the duty driver will take the radioactive shipment to the Phase I CQ who will follow the routine radioactive shipment receipt procedures. The Phase I CQ must enter the receipt in the CQ Log Book. Personnel from the Bldg Engineering Office will advise the Health Physics representative the morning of the next duty day.

SUBJECT: Medical Evaluation of Radiation Workers

1. It is necessary periodically to evaluate the health of radiation workers to provide baseline data for future comparisons, supplement the radiation protection program, provide for timely detection of developing medical problems, and for medicolegal resons.

2. Physical Examinations.

a. Initial examination:

*(1) Preplacement/pre-employment medical examination using SF88 and $F93 for military personnel and SF78 for civilian personnel to include the following:

(a) Complete blood count (white cell count with differential and hemoglobin) to establish a baseline.

(b) A review of prior occupational exposure, and a description of any unusual exposure to ionizing radiation resulting from previous occupations or accidents.

(c) Any information of diagnostic or therapeutic radiation exposure. This information will be recorded as a portion of the history, but will not be entered on DD Form 1141 (Record of Occupational Exposure to Ionizing Radiation).

(d) Any medical examination procedures (i.e. X-rays) performed within one year prior to this examination may permit exclusion of that portion of the initial examination.

(2) Abnormal findings discovered during medical examinations will be evaluated by the Chief, Medical Division, to determine if additional occupational exposure to radiation would be harmful.

b. Periodic and termination examinations. Every three years and at termination of employment as a radiation worker, an examination, identical to the initial examination will be given.

c. Special examinations: Evaluations required by the Chief, Medical Division, to assist in a detailed medical study if required by an accidental exposure to potentially dangerous radiation doses.

3. Bioassay Studies.

a. Responsibilities.

(1) Co-user - A co-user must notify Health Physics NCOIC prior to the beginning of any research study that will utilize, at any one time, quantities of an isotope greater than the operational levels indicated in the following table.

(2) Health Physics Office, WRAMC - Will provide support and guidance through the Health Physics NCOIC in safe isotope handling practices, will notify the Chief, Medical Division, concerning bioassay requirements for specific radiation workers, and will assist in performing required bioassays.

*(3) Chief, Medical Division - Will review the health hazards, determine the required bioassay measurements, and evaluate the bioassay findings. Will maintain procedures for counting 131_I and 125_I activity in the thyroid in accordance with techniques utilized at WRAMC Nuclear Medicine Department.

b. Table of operational levels and scheduling of bioassay measurements:

ISOTOPE	OPERATIONAL LEVELS (mCi)	TYPE OF MEASUREMENT	FREQUENCY OF MEASUREMENT
H-3	10	urine, 24 hr sample	weekly & completion of study
P-32	10	urine, 24 hr sample	monthly & completion of study
S-35	10	urine, 24 hr sample	monthly & completion of study
Ca-45	1	urine, 24 hr sample	monthly & completion of study
Fe-59	10	whole body count & blood count	every six months monthly
Zn-65	10	urine, 24 hr sample	monthly & completion of study
Rb-86	10	urine, 24 hr sample	every 2 weeks & completion of study
I-125	5	thyroid count	monthly
I-131	1	thyroid count	monthly

4. References.

a. WR 40-10 (Annex F)

b. MEDEC-YHP, Memo 2 (WRAMC-Health Physics)

HEALTH PHYSICS
WALTER REED ARMY MEDICAL CENTER
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HSWP-QHP
*SOP
Number 1-6

3 November 1977

LEAK TESTING AND INVENTORY OF SEALED SOURCES

1. Purpose. The purpose of this SOP is to provide continuity in the standard leak testing procedures for sealed sources containing alpha, beta and/or gamma emitting radionuclides possessed, used and stored at WRAMC and DORF. This SOP supplements WR 40-10.

2. General.

a. Despite the fact that many precautions are taken to prevent leakage, the radioactive materials do occasionally leak from the capsule. Radioactive material which leaks from a source is a hazard in that it may become airborne or transported in some other way to become inhaled or ingested by personnel. The purpose of leak-testing sealed sources is to detect the leakage of the radionuclide before it becomes a hazard, and to comply with applicable regulations.

b. Sources at DORF will be leak-tested, inventoried and records thereof maintained, by DORF H.P. All other sources at WRAMC will be leak-tested by R & S Branch, B079, WRAIR.

c. Where a conflict of regulations (to include applicable USNRC Licenses and DA Authorizations) exists, the more restrictive regulation will be followed.

d. Sealed Source means any radioactive material that is inclosed in, or is to be used in, a container in a manner intended to prevent leakage of the radioactive material or any of its daughter products (See AR 40-37 and AR 700-52).

e. Each sealed source with an activity greater than 100 microcuries of beta and/or gamma and 10 microcuries of alpha received at WRAMC and DORF, containing radioactive material, other than 3-Hydrogen (Tritium), with a half-life greater than thirty (30) days and in any form other than gas, will be tested by Health Physics, WRAMC, for contamination and/or leakage prior to release to the user. However, if the vendor or source supplier furnishes a certificate indicating that a test has been made, the source need not be tested. Thereafter, all sources will be tested for leakage by Health Physics, WRAMC, at intervals not to exceed six (6) months, except that each source emitting alpha particles will be tested at intervals not to exceed three (3) months.

*This SOP supersedes HP SOP Number 1-6, dated 15 February 1974

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f. If there is reason to suspect that a sealed source might have been damaged, it will be tested for leakage before further use.

g. All sealed sources found to be leaking and/or contaminated will be immediately withdrawn from use by Health Physics. The Health Physics Officer will determine whether or not the source is leaking. If it is leaking, he will direct that it be resealed or disposed of in accordance with existing regulations.

3. Safety.

a. Appropriate safety measures will be observed while performing leak tests to minimize personnel exposures. Such measures will maximize the use of time, distance and shielding.

b. High intensity sources such as brachytherapy sources will not be touched. They will be handled with remote handling devices or long-handled forceps.

c. Appropriate personnel monitoring devices such as whole-body film badges, wrist film badges and self-reading dosimeters will be worn while performing leak tests.

4. Leak Testing Methods.

a. In general, alpha, beta and gamma sealed sources are leak tested by taking a one (1) inch diameter filter paper disc and obtaining a dry or wet wipe of accessible areas of the source or source holder in which the source is permanently mounted. When taking wet wipes the solution used should not be harmful to the source capsule or holder. All exposed surfaces of the source or holder will be wiped. Paper wipes will be placed in paper envelopes or plastic bags and sent to the RA Laboratory for analysis. Care will be taken to avoid cross-contamination.

b. Radium Sources.

(1) Brachtherapy sources (Charcol Adsorption Test) - Approximately 1/2 gram of activated charcoal is placed in a capped/stoppered glass tube. A wad of cotton is placed over the charcoal to separate charcoal and source. The source will remain in the sealed tube for at least 24 hours. After 24 hours, uncap the tube, remove the source, immediately reseal the tube and send sample to RA Laboratory. A blank charcoal control will be sent along with each sample to distinguish environmental radon from that produced by the source.

(2) Other radium sources - Sources too large to be tested by the method outlined in b(1), above, will be tested by using a sealable plastic bag in place of the glass tube. All other procedures will be the same as b(1).

c. Gamma Irradiators (AECL Gammacells) - Dry paper wipes will be obtained from the following locations if they are accessible:

(1) Upper external ram.

(2) Inside the irradiator chamber.

(3) Lower external ram.

(4) Floor beneath the ram.

Leak testing will be performed with the source in the unexposed position.

d. Gamma teletherapy and gamma calibration units - Dry paper wipes will be taken from selected accessible surfaces of the teletherapy head or beam port. Surfaces wiped will be those which would most likely become contaminated in case of source leakage and will include inner surfaces of beam collimating device. Extreme care will be taken not to damage or displace aiming devices during the procedures. Testing will be performed with the source in the unexposed position.

5. Sample Processing.

a. All samples will be forwarded to the RA Laboratory for quantitative analysis with a completed WRAMC Form 708. Samples will be identified by the Health Physics Control Number of the source tested.

b. Data furnished for samples taken by the Charcoal Adsorption Test will include the time when the source was removed from the glass tube.

c. Samples will be analyzed by the RA Laboratory using appropriate methods and results returned to requestor.

6. Evaluation.

a. Radium Sources - If any leakage is detected above minimum detectable activity, the source will be suspected of leaking and will be retested. The maximum value of leakage acceptable will be less than 0.001 microcuries (2.22×10^3 dpm).

b. Other Sources - If any leakage is detected above minimum detectable activity, the source will be suspected of leaking and will be retested. The maximum value of leakage acceptable will be less than 0.005 microcuries (1.11×10^4 dpm).

7. Disposed of Leaking Sources.

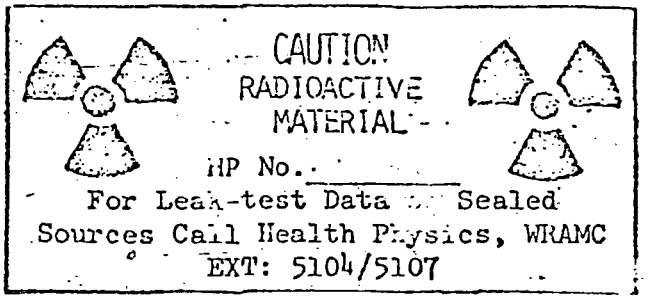
All sources found to be leaking greater than the values specified in para 6, above, will be handled in accordance with 10 CFR 34.25 and 10 CFR 20, and will be disposed of in accordance with AR 700-52 and AR 755-15.

8. Inventory of Leak Testing Records and Sealed Sources.

a. The leak testing procedure as specified in para 2e of this SOP shall constitute the inventory of sealed sources required by 10 CFR 34.25.

b. Each accountable sealed source as specified in para 2e at WRAMC will be assigned a Health Physics control number by the NCOIC, R&S Branch.

c. Each sealed source or its container will be labeled as shown below with the Health Physics control number for that source:



d. A Record of Sealed Source Inventory and Leak Testing for each sealed source will be maintained by the NCOIC, R&S Branch, and will be kept in Room B079, Bldg 40. In accordance with AR 700-52, the Record of Sealed Source Inventory and Leak Testing will contain the following information:

(1) Description of item.

(2) Radioisotope.

(3) Activity in microcuries (Milligrams for 226-Ra sources).

(4) Location of item.

(5) Serial number (if any).

(6) Responsible user and WRAMC Isotope Authorization.

(7) Health Physics Control Number.

(8) Date source received.

(9) Date of inventory and initials of person performing same. Entries will be made when the source is transferred or disposed of in accordance with applicable regulations.

e. The Record of Sealed Source Inventory and Leak Testing will also serve as a record of leak testing. Consecutive entries will be made for each test and include the date, activity detected in microcuries, and initials of person performing test.

9. References.

a. Title 10, Code of Federal Regulation, US NRC.

b. AR 40-37, Radioisotope License Program (Human-Use).

c. AR 700-52, Licensing and Control of Sources of Ionizing Radiation.

d. AR 755-15, Disposal of Unwanted Radioactive Material.

e. TB MED 249 (NBSH-73), Protection Against Radiation from Sealed Gamma Sources.

f. TB MED 62, Diagnostic X-ray, Therapeutic X-ray and Gamma-Beam Protection for Energies Up to 10 Million Electron Volts.

g. TM 3-261, Handling and Disposal of Unwanted Radioactive Material.

h. NCRP Reports 28, 30, 33, 34, 40 and 41.

i. NBS Handbook 114.

j. WRAMC Regulation (WR) 40-10, Health Physics Regulations.

k. HP SOP 1-2, Counting Procedures.

l. HP SOP 2-2, Radioactivity Analysis Laboratory.

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Health Physics Officer

HEALTH PHYSICS
WALTER REED ARMY MEDICAL CENTER
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HSWP-QHP
SOP Number 1-2*

12 September 1977

COUNTING PROCEDURES

1. Purpose. To provide standard counting procedures and methods for statistical analysis in order to insure valid, economic, and rapid assays of samples submitted for radioanalysis.

2. Evaluation of Counting System Performance.

a. General. Before anyone attempts to calibrate a counting system, he should have assurance that the system is electronically adjusted for optimum efficiency and that it will, when so adjusted, detect radiation with an acceptable degree of accuracy and dependability.

b. Electronic Adjustment. In accordance with the counting system instruction manual the high voltage, sensitivity, and attenuation should be adjusted for optimum counting efficiency.

c. Chi-Square (χ^2) Test. Each counting system should be given the following performance test before it is calibrated and as necessary thereafter. If it does not pass the test, it should be repaired.

(1) Obtain a sturdy, long half-life source of approximately 10^4 dpm. This will be known as the "check source".

(2) Make 20 two-minute counts with the check source. Tabulate the following data (See Figure 1, page 4):

(a) Net Counts Per Minute (Gross cpm - BG cpm) $\equiv \chi$

(b) Deviation of χ from $\bar{\chi} \equiv (\chi - \bar{\chi})$

Note: $\bar{\chi} \equiv$ average value of the 20 two-minute counts

(c) $(\chi - \bar{\chi})^2$

(3) Sum the $(\chi - \bar{\chi})^2$ and divide this number by $\bar{\chi}$. The quotient thus obtained is called chi-squared (χ^2).

$$\chi^2 = \frac{\Sigma(\chi - \bar{\chi})^2}{\bar{\chi}}$$

(4) Table I, following, lists the numerical values of χ^2.

* This SOP supersedes SOP 1-2, dated 10 June 1974

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TABLE I

TABLE OF CHI-SQUARED

(N-1) Degrees of Freedom	Probability						
	0.99	0.95	0.90	0.50	0.10	0.05	0.01
	Values of Chi-Squared						
2	0.020	0.103	0.211	1.386	4.605	5.991	9.210
3	0.115	0.352	0.584	2.366	6.251	7.815	11.345
4	0.297	0.711	1.064	3.357	7.779	9.488	13.277
5	0.554	1.145	1.610	4.351	9.236	11.070	15.086
6	0.872	1.635	2.204	5.348	10.645	12.592	16.812
7	1.239	2.167	2.833	6.346	12.017	14.067	18.475
8	1.646	2.733	3.490	7.344	13.362	15.507	20.090
9	2.088	3.325	4.168	8.343	14.684	16.919	21.666
10	2.558	3.940	4.865	9.342	15.987	18.307	23.209
11	3.053	4.575	5.578	10.341	17.275	19.675	24.725
12	3.571	5.226	6.304	11.340	18.549	21.026	26.217
13	4.107	5.892	7.042	12.340	19.812	22.362	27.688
14	4.660	6.571	7.790	13.339	21.064	23.685	29.141
15	5.229	7.261	8.547	14.339	22.307	24.996	30.578
16	5.812	7.962	9.312	15.338	23.542	26.296	32.000
17	6.408	8.672	10.085	16.338	24.769	27.587	33.409
18	7.015	9.390	10.865	17.338	25.989	28.869	34.805
19	7.633	10.117	11.651	18.338	27.204	30.144	36.191
20	8.260	10.851	12.443	19.337	28.412	31.410	37.566
21	8.897	11.591	13.240	20.337	29.615	32.671	38.932
22	9.542	12.338	14.041	21.337	30.813	33.924	40.289
23	10.196	13.091	14.848	22.337	32.007	35.172	41.638
24	10.856	13.848	15.659	23.337	33.196	36.415	42.980
25	11.524	14.611	16.473	24.337	34.382	37.382	44.314
26	12.198	15.379	17.292	25.336	35.563	38.885	45.642
27	12.879	16.151	18.114	26.336	36.741	40.113	46.963
28	13.565	16.928	18.939	27.336	37.916	41.337	48.278
29	14.256	17.708	19.768	28.336	39.087	42.557	49.588

The acceptable limits of probability are from 0.95 to 0.05. The number of determinations (N) is 20 and there is one restriction in this type of test; therefore, (N-1) = 19 degrees of freedom. From Table I, the acceptable value of χ^2 is a number between 10.117 and 30.144.

d. Quality-Control Charts (Figure 2)

(1) Purpose. The quality-control chart provides a guide for:

(a) Judging when and how much correction of instrument operation is required.

(b) Reducing tolerances when desirable.

(c) Anticipating or diagnosing faulty instrument behavior.

(2) Preparation. The quality-control chart will be prepared monthly after performance of the χ^2 test. The data derived from the χ^2 test will be used in the preparation of the plot in the following manner:

(a) Calculate the standard deviation (σ). For discussion see para 3a.

$$\sigma = \sqrt{\frac{\Sigma (x-\bar{x})^2}{N-1}}$$

(b) Multiply the by 1.96 (the 95% Confidence Factor).

(c) On a linear plot of cpm (vertical axis) vs. time in days (1-31) draw a horizontal line midway on the vertical axis. Label this line with the numerical value of χ determined on the χ^2 test.

(d) Above and below this line draw dotted lines. The distance from the solid line to the dotted line will be equal to the product of 1.96σ as determined in para 2d (2) (b), above.

(e) The solid line is the "true count rate" of the check source. The dotted lines above and below the solid line indicate the limits of acceptable statistical variations. If the counting system is performing satisfactorily, 95% of a statistically large number of two-minute counts of that check source should fall within the area bounded by the dotted line.

(3) Use of the Quality-Control Chart. At the start of each counting day the check source should be counted for two minutes. The Net Counts Per Minute (NCPM) obtained are then plotted on the Quality-Control Chart at the appropriate calendar date position. The plotted point should be within the dotted lines. If so, the counting system is performing satisfactorily.

^{14}C

Chi-Squared Test

1	6399
2	6405
3	6448
4	6414
5	6327
6	6246
7	6120
8	6424
9	6438
10	6339
11	6251
12	6401
13	6342
14	6544
15	6365
16	6317
17	6270
18	6451
19	6475
20	6407

$\Sigma x_i = 127383$

$\bar{X} = 6369$

$\Sigma (x_i - \bar{x})^2 = 161,669$

$\chi^2 = \frac{\Sigma (x_i - \bar{x})^2}{\bar{x}} = 25.4$

- for 20 counts $\chi^2 \equiv \{10.117 - 30.144\}$ @ 95% CL (2σ)

$\sigma = \sqrt{\frac{\Sigma x_i}{19}} = 92.2$ cpm

σ @ 95% CL = $\pm (1.97)(92.2)$

Count Range $\bar{X} \pm \sigma$ @ 95% CL

6369 ± 182

eff: $A = 2.74 \times 10^4$ DPM in 6-14-66

$t_{\frac{1}{2}} = 5730$ yr

$t =$

$\text{eff} = \frac{\bar{X}}{\%A \times A}$

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FIGURE 1

MONTH Sep Machine WB-II · Quality Control

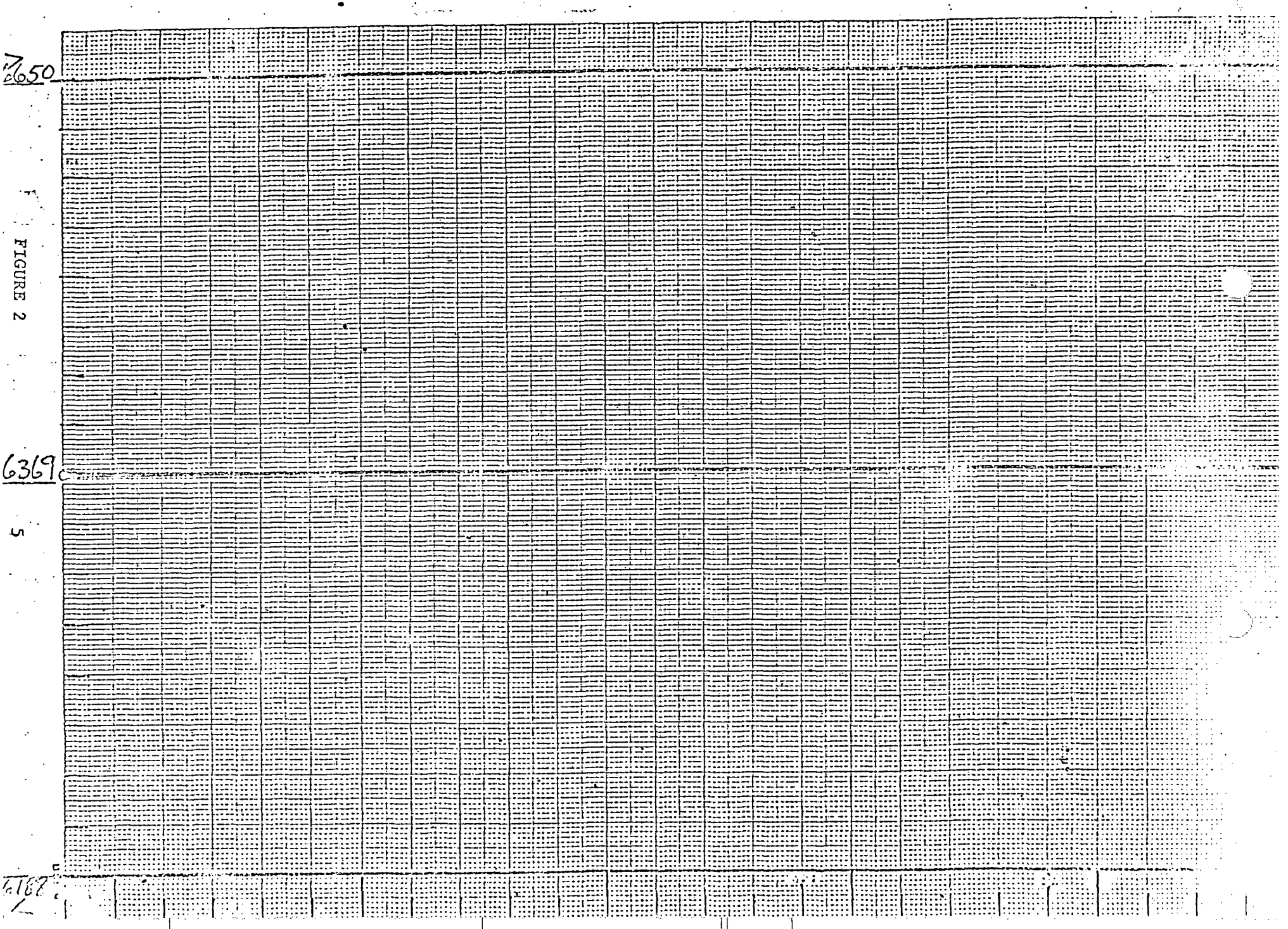


FIGURE 2

If the plotted point is not within the dotted lines, the instrument control settings should be examined for correctness. Possible causes of malfunctions which can be readily checked are shifts in operating voltages or gain, detector damage, line noise, large background increases, or an erratic timer, scaling strip, or register. The standard itself should be examined for wearing of the protective covering or leakage, which could cause increased or decreased counting levels, respectively. If the fault cannot be corrected, the instrument should be removed from routine operation until repaired. The quality control chart should be continuously examined for indications of trends toward unacceptable operation so that potential malfunction of the instrument system or other sources of faults can be corrected as quickly as possible. Gradually decreasing counts may be caused by subtle degradation of the photomultiplier tube in scintillation systems. Each incurred fault and its method of correction should be noted in the quality-control log. This will assist in analytical data evaluations or in the diagnosis of instrument malfunction.

3. Counting Precision.

a. Standard Deviation.

(1) The process of radioactive decay is a random phenomenon, the events being counted from a random sequence in time. Therefore, counting for a finite period of time can only yield an estimate (r) of the true, average counting rate ($\bar{r}$). The degree or measure of precision is directly related to the standard deviation (σ) as shown by the following table:

TABLE II

T_s	C_s	R_s	σ	%E
.01	100	10,000	1,000	10.0%
1.00	10,000	10,000	100	1.0%
100.00	1,000,000	10,000	10	0.1%

Where: T_s = Sample Counting Time (minutes)

C_s = Net Sample Counts

R_s = Net Sample Counts per Minute

σ = Standard Deviation $\left(\sqrt{\frac{R_s}{T_s}}\right)$

%E = Percent Error $\frac{(100\sigma)}{R_s}$

(2) An examination of the table shows that in the first instance the sample was counted for a very short time but (let us assume) the count rate was found to be 10,000 cpm. Now, examine the last entry; here the sample was counted for a long time but still the count rate was found to be 10,000 cpm. The difference between the two examples is that the first measurement must be reported as 10,000 cpm ± 10% @ 68% Confidence Level (CL) - relatively approximate estimation; while the last entry may be reported as 10,000 cpm ± 0.1% @ 68% CL - a fairly exact measurement.

(3) For health physics purposes a 25% counting error is usually sufficiently accurate. The percent error and the Confidence Level used must always be reported. The Confidence Level is the standard deviation multiplied by a factor, for example:

0.675σ = 50% Confidence Level (CL)

1.000σ = 68% Confidence Level (CL)

1.645σ = 90% Confidence Level (CL)

1.960σ = 95% Confidence Level (CL)-Normally rounded-off to 2.000

3.000σ = 99.7% Confidence Level (CL)

Counting at Health Physics is usually done at the 2σ or 95% Confidence Level. Therefore, the last example cited in 3a(2) above would be reported as:

$$C_s \pm \frac{2\sigma}{C_s}(100) \text{ @ 95\% CL}$$

$$\text{or } 10{,}000 \text{ NCPM} \pm \frac{2(10)}{10{,}000} \text{ @ 95\% CL}$$

$$= 10{,}000 \text{ NCPM} \pm 0.2\% \text{ @ 95\% CL}$$

b. Minimum Detectable Activity.

(1) The Minimum Detectable Activity (MDA) is a function of the sensitivity of the counting system, the background count rate, the length of time available for counting the sample, and the counting precision desired. For the normal health physics survey evaluation a Counting Error of ±25% is acceptable. The sensitivity of the counting system is determined by the distance of the sample from the sensitive volume of the detector, the mounting materials used, the energy of the emitted radiation, and the quantity and type of absorbing materials between the sample being counted and the detector.

(2) The MDA is calculated at 3σ (99.7% CL) as follows:

$$MDA = 3\sqrt{\frac{R_b}{T_b}}$$

Where R_b = Background Counting Rate

T_b = Length of Count

3 = 99.7% CL

e.g. BG = 400 counts in 10 minutes or 40 cpm

then MDA $= 3\sqrt{\frac{40}{10}} = 3\sqrt{4} = 3(2) = 6$ cpm

Therefore; the MDA is 6 NCPM, or we are 99.7% confident that 6 NCPM represent real activity and are not due to a statistical fluctuation of the background counting rate.

(3) The value thus calculated is valid only for a sample counting time equal to the background counting time and is dependent upon the ability of the counting system to reproduce the background obtained.

c. High Count Rate Corrections.

(1) Every counting system has a finite upper limit on its counting rate capacity. At high count rates errors are encountered from coincidence loss, dead time, and resolution limitations.

(2) Determination of Dead Time (the length of time a counting system requires to process a single pulse during which interval the system is insensitive to additional pulses).

(a) A simple way to evaluate Dead Time (t) is by the "Split Source" method. Four counting rates are required:

1. R_b = Background Counting Rate (cpm)
2. R_1 = First Beta Source (Gross cpm)
3. R_2 = Second Beta Source (Gross cpm)
4. R_{1+2} = First and second Beta Sources counted together (Gross cpm)

Calculation:

$$t = \frac{R_1 + R_2 - R_{1+2} - R_b}{(R_{1+2})^2-(R_1)^2-(R_2)^2} = \underline{\text{Minutes}}.$$

(b) Direct determination of the dead time by use of an oscilliscope is recommeded when the equipment is available.

(3) The dead time value may be used to determine the True Counting Rate using the following formula:

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$$R_s = \frac{r}{1-rt}$$

Where: R_s = True Net Count Rate (NCPM)

r = Observed Net Count Rate (NCPM)

t = System Dead Time (minutes)

4. Calibration of Counting System.

a. General. After it has been determined that a counting system is performing satisfactorily, it must be calibrated. By calibration we mean the establishment of a fixed and known relationship between the output of the counting system and the identity and quantity of the careful measurement of a "certified standard" which may be defined as a radioactive sample that has been assayed by a reputable scientific or commercial organization.

b. Selection of Counting Standards. Normally, the following standards will be used for comparison with unidentified, mixed samples:

α - emission - ^{210}Po , ^{241}Am

β - emission (unidentified laboratory samples) ^{14}C

γ - emission - ^{137}Cesium

NOTE: The 0.662 Mev Gamma-Ray from 137 Cesium and is considered to be suitable for Mixed Fission Product Calibration.

c. Comparative Counting. Comparing a sample disintegration rate to that of a known standard is only accurate when the geometries are identical and the count rates are similar.

5. Evaluation of Samples.

a. Known Identity.

(1) If the identity of the radionuclide is established and the counting efficiency has been determined with a certified standard of that radionuclide, the activity is simply determined by preparing, mounting, and counting the sample. The dpm is then calculated using the following relationship:

$$dpm = \frac{NCPM}{Eff}$$

NCPM = Net Counts Per Minute

Eff = Counting Efficiency of the System

(2) If the identity of the radionuclide is known but the counting efficiency has not been determined with a certified standard of that radionuclide, then an estimation of the activity may be obtained by use of a plot of Energy vs Efficiency that has been prepared for a specific counting instrument and counting geometry using calibrated sources. See Figure 2. The counting efficiency for a predetermined energy is read from the graph and the activity is then calculated using the relationship in 5a(1) above.

b. Unknown Identity.

(1) When the identity of the radionuclide(s) is unknown and the health physics evaluation requires identification for the establishment of adequate control, the sample should be analyzed by either gamma spectrometry, chemical separation, half-life determination, Feather Analysis, or a combination of these methods. When the analyses have been accomplished and the identity of the radionuclide has been established, the activity should be determined in accordance with the previous instructions.

(2) If adequate control or evaluation does not depend on identification of the radionuclides, an estimation of the activity may be based on the radioisotopes listed in para 4b above.

c. Wipe Counting - Single Samples. Normally wipes are counted for only one minute each. This however is dependent upon the MDA of the system for the radionuclide(s) under consideration and the current contamination levels. It may, therefore, be necessary to lengthen the counting time on occasion in order to obtain suitable counting statistics (see para 3).

d. Efficient Distribution of Counting Time.

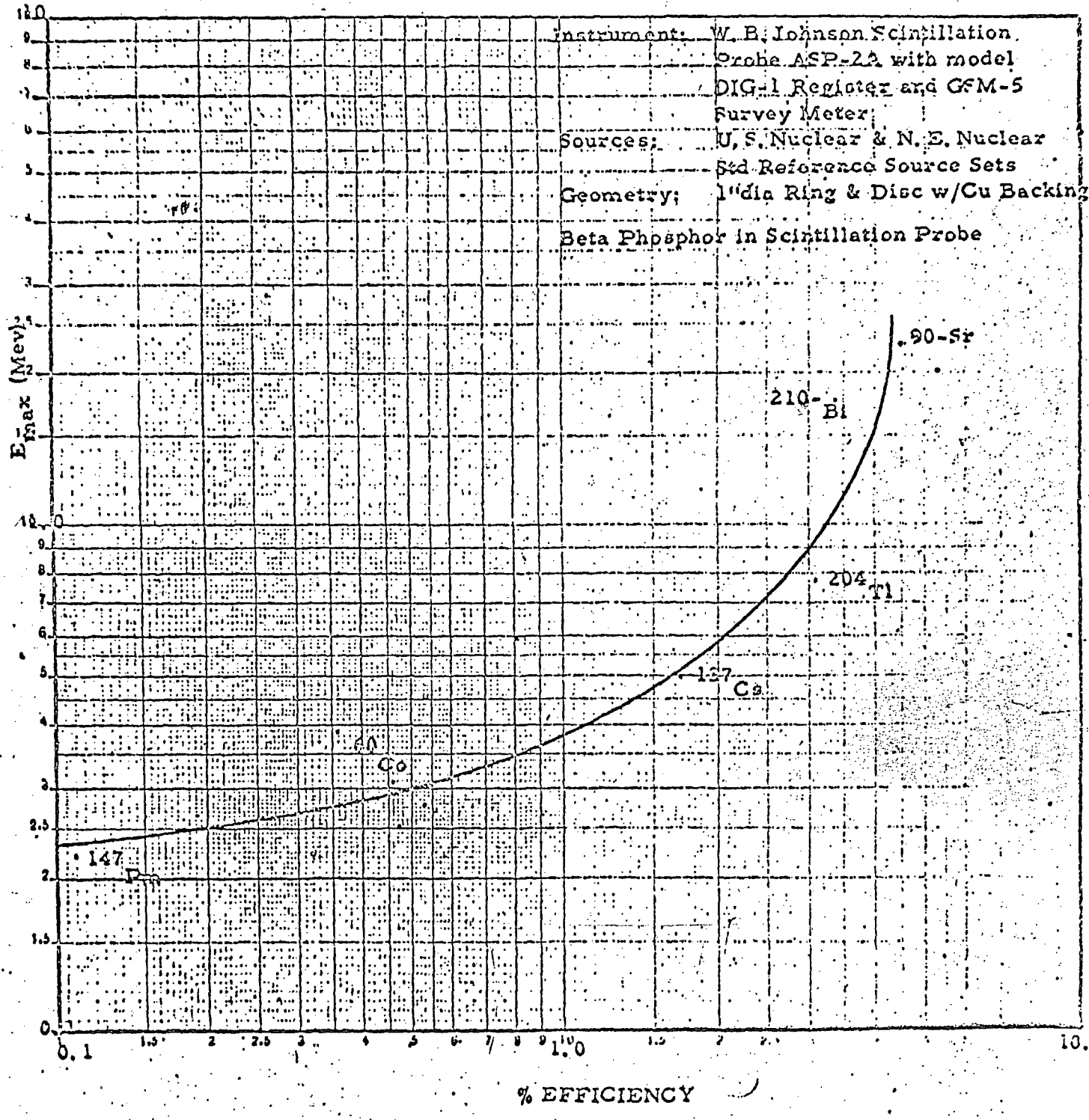
(1) When the activity of a sample is low compared to the background counting rate, it is advantageous to calculate the most efficient distribution of counting time between the sample activity and the background activity in order to minimize the counting error.

(2) It can be shown that for a particular time distribution, the counting error will be at a minimum. The time distribution is calculated as follows:

$$\frac{T_{b+s}}{T_b} = \sqrt{\frac{R_{b+s}}{R_b}}$$

Figure 2

MAXIMUM BETA ENERGY vs % EFFICIENCY



where T_{b+s} = Length of Sample plus Background Count in Minutes

T_b = Length of Background Count in Minutes

R_{b+s} = Gross Counting Rate of Sample plus Background

R_b = Background Counting Rate

e.g. Suppose a sample has an activity of 4,000 cpm and the background is 40 cpm; then

$$\frac{T_{s+b}}{T_b} = \sqrt{\frac{4000}{40}} = \sqrt{100} = 10$$

This means that for the most efficient distribution of counting time with minimum counting error for a given time, the sample should be counted for a time interval that is ten times that of the background determination.

6. Calculation of Activity. See the attached Appendix A for the methods and units employed to calculate the activity of samples analyzed by the Radioactivity Analysis Laboratory, Health Physics, WRAMC.

7. Statistical Analysis of Environmental Data.

a. All environmental sample data is subjected to standard statistical tests of significance. Chauvenet's Criterion is utilized to establish the acceptable deviation.

b. When the observed ratiation level of the environmental sample exceeds the base line environmental radiation level by more than the acceptable deviation as established by Chauvenet's Criterion, the sample is held for further evaluation and additional representative samples are obtained for analysis

8. References.

a. Dixon and Massey, Introduction to Statistical Analysis, 1957

b. Jarrett, A.A., Statistical Methods Used in the Measurement of Radioactivity With Some Useful Graphs and Monographs, USAEC, 1946.

c. Loevinger, R. and Berman, M., Efficiency Criteria in Radioactivity Counting, 1951

d. Overman and Clark, Radioisotope Techniques, 1960

e. Chase and Rabinowitz, Principles of Radioisotope Methodology, 1964

f. WILSON, B. J., The Radiochemical Manual, 1966.

g. NBS Handbook 80 - A Manual of Radioactivity Procedures, 1961.

h. ICRU Report 19 - Radiation Quantities and Units, 1971.

i. ICRU Report 10c - Radioactivity, 1963.

j. ICRU Report 12 - Certification of Standardized Radioactive Sources, 1968.

k. ICRU Report 22 - Measurement of Low-Level Radioactivity, 1972.

APPENDIX A - Calculation Sheets

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12 September 1977

CALCULATION SHEETS

The mathematical symbols used in this Appendix are defined as follows:

SYMBOL	DEFINITION	UNITS
C	Activity Concentration	µCi/ml
R_s	Net Counting Rate of Sample	NCPM
R_b	Background Counting Rate of Counting System	cpm
R_{b+s}	Gross Counting Rate of Sample includes R_b	cpm
eff	Counting Efficiency for the Counting System	NCPM/dpm
V	Volume of Sample Counted	ml
t_{b+s}	Length of Gross Sample Count	min
t_b	Length of Background Count	min
Y	Chemical Recovery or Yield Factor	
%E	Percent Error	
σ	Standard Deviation	
dpm	Disintegrations per minute	
4.5×10^{-7}	Microcuries per Disintergration	µCi/dpm
µCi	Microcurie	10^{-6} Ci
2.22×10^{6}	Disintegrations per Microcurie	dpm/µCi
pCi	Picocuries	10^{-12} Ci
2.83×10^{4}	Cubic Centimeters per Cubic Foot	cc/ft^3
A	Sample Area in Square Meters	M^2
Nd	Interval of Exposure Time in Days	Days
Wt_s	Net Weight of Sample in Grams	g

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SYMBOL	DEFINITION	UNITS
CL	Confidence Level	%
SA	Self Absorption Factor	
MDA	Minimum Detectable Activity	µCi or dpm

SUBJECT: APP A to HP SOP 1-2

Percent Error Calculation Sheet

$$* \quad \%\text{Error}(E) = \frac{2\sqrt{\frac{R_{b+s}}{t_{b+s}} + \frac{R_b}{t_b}}}{R_s} \times 100$$

Where:

$R_{b+s} = 3.08 \times 10^3$ cpm

$R_b = 7.65 \times 10^2$ cpm

$R_s = 2.32 \times 10^3$ NCPM

$t_{b+s} = 10$ minutes

$t_b = 10$ minutes

$$\therefore \%E = \frac{2\sqrt{\frac{3.08\times10^3}{10} + \frac{7.65\times10^2}{10}}}{2.32\times10^3} \times 100$$

$$= \frac{2(1.96\times10^1)}{2.32\times10^3} \times 100$$

$$= 1.69\% \text{ @ } 95\% \text{ CL (Confidence Level)}$$

* Note: Error is always calculated at the 95% Confidence Level (1.96 σ which is normally rounded-off to 2.000.)

Also; the expression $\sqrt{\frac{R_{b+s}}{t_{b+s}} + \frac{R_b}{t_b}}$ is another method of determining the Standard Deviation (σ), refer to 2d(2)(a) and 3a of the HP SOP 1-2.

Wipe Analysis for Removeable Contamination

Calculation Sheet

$$dpm = \frac{NCPM}{eff}$$ for β and α samples

$$dpm = \frac{N\gamma PM}{eff}$$ for Integral γ Analysis of Samples - (Normally referenced to ^{137}Cs)

$$dpm = \frac{N\gamma PM_{pp}}{\gamma_a \, eff_\gamma}$$ for analysis of γ emitters whose identity has been determined

Where:

$N\gamma PM_{pp}$ ≡ Net Gamma Counts per Min Under photopeak area. (peak Channel ± 2 channels)

γ_a ≡ Gamma Abundance for the photopeak energy being measured.

eff_γ ≡ Counting efficiency of the System for Counting the 5 channel energy range of the subject photopeak.

Activity Concentration Reported:

dpm per wipe normally referenced to

- ^{14}C for β
- ^{137}Cs for γ
- ^{210}Po for α

Note: The relationships shown will be used in many other activity determinations.

Low Level Net β+α Activity Determinations in Waste Water

Calculation Sheet

$$C = \frac{R_s (4.5 \times 10^{-7})}{(eff)(V)(Y)(SA)}$$

Where:

R_s = 1.85 NCPM @ 1510 hrs 11 Jul 66
R_b = 1.31 cpm
R_{s+b} = 3.16 cpm
t_{s+b} = 60 min
t_b = 120 min
eff = 0.235 NCPM/dpm (^{204}Tl)
SA = 0.843
Y = 0.85
V = 1×10^3 ml

$$\therefore C = \frac{(1.85 \text{ NCPM})(4.5 \times 10^{-7} \mu Ci/dpm)}{\left(0.235 \frac{\text{NCPM}}{dpm}\right)(1 \times 10^3 \text{ ml})(0.843)(0.85)} = 4.92 \times 10^{-9} \mu Ci/ml$$

$$\%E = \frac{2\sqrt{\frac{3.16}{60} + \frac{1.31}{120}}}{1.85} \times 100 = 27.2\%$$

Activity Concentration Reported:

$4.92 \times 10^{-9} \mu Ci/ml \pm 27.2\%$ @ 95% CL @ 1510 hrs 11 Jul 66

Waste And DORF Pool Water for Gamma Analysis

Calculation Sheet

$$C = \frac{R_s (4.5 \times 10^{-7})}{(eff)(V)}$$

Where:

$R_s = 2.32 \times 10^3$ NCPM @ 1340 hrs 14 Jul 66
$R_{b+s} = 3.08 \times 10^3$ cpm
$R_b = 7.65 \times 10^2$ cpm
$t_{b+s} = 10$ min
$t_b = 10$ min
* eff = 0.14 NCPM / dpm (^{137}Cs)
$V = 2.5 \times 10^3$ ml

$$C = \frac{(2.32 \times 10^3 \text{ NCPM})(4.5 \times 10^{-7} \mu Ci/\text{dpm})}{(0.14 \text{ NCPM/dpm})(2.5 \times 10^3 \text{ ml})}$$

$$= 2.98 \times 10^{-6} \mu Ci/ml$$

$$\%E = \frac{2\sqrt{\frac{3.08 \times 10^3}{10} + \frac{7.65 \times 10^2}{10}}}{2.32 \times 10^3} \times 100$$

$$= \frac{2(1.96 \times 10^1)}{2.32 \times 10^3} \times 100 = 1.69\%$$

Activity Concentration Reported:

$2.98 \times 10^{-6} \mu Ci/ml \pm 1.69\%$ @ 95% CL @ 1340 hrs 14 Jul 66

* Note: The eff used is for ^{137}Cs in 2000 ml of H_2O, Counted Integrally over 0-3.0 MeV in a Marinelli Type Beaker on the 4"x4" NaI Xtal.

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SUBJECT: APP A to HP SOP 1-2

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Gamma Analysis Of Flora Samples

Calculation Sheet

$$pCi/gm = \frac{(R_s)(4.5\times10^{-1})}{(eff)(Wt_s)}$$

Where: R_s = 8571 NCPM @ 1520 25May66

R_{s+b} = 9365 cpm

R_b = 794 cpm

t_{s+b} = 10 min

t_b = 10 min

eff = 0.132 NCPM/dpm (^{137}Cs)

Wt_s = 2×10^3 gm

$$pCi/gm = \frac{(8.571\times10^3\ NCPM)(4.5\times10^{-1}\ pCi/dpm)}{(0.132\ NCPM/dpm)(2\times10^3\ gm)}$$

$$= 14.6\ pCi/gm$$

$$\%E = \frac{2\sqrt{\frac{9365}{10}+\frac{794}{10}}}{8571}\times100 = 0.75\%$$

Activity Concentration Reported:

14.6 pCi/gm ± 0.75% @ 95% CL @ 1520 hrs 25May66

Determined by Integral γ Analysis (0-3.0 MeV)

Gamma Analysis Of Fallout-Washout Samples

Calculation Sheet:

$$pCi/M^2/day = \frac{(R_S)(4.5\times10^{-1})}{(eff)(A)} \Big/ Nd$$

Where: R_S = 35.6 NCPM @ 1557 25 Jul 66
R_{S+b} = 777.8 cpm
R_b = 742.2 cpm
t_{S+b} = 10 min
t_b = 10 min
eff = 0.142 NCPM/dpm (^{137}Cs)
A = 0.06 M^2
Nd = 7 days

$$\therefore pCi/M^2/day = \frac{(35.6\ NCPM)(4.5\times10^{-1}\ pCi/dpm)}{(0.142\ \frac{NCPM}{dpm})(0.06\ M^2)} \Big/ 7\ days$$

$$= \frac{188\ pCi/M^2}{7\ days} = 26.9\ pCi/M^2/day$$

$$\%E = \frac{2\sqrt{\frac{778.8}{10}+\frac{742.2}{10}}}{35.6}\times100 = 69\%$$

Activity Concentration Reported:

26.9 pCi/M^2/day ± 69% @ 95% C.L. @ 1557 hrs 25 Jul 66
Determined by Integral γ Analysis (0-3.0 MeV)

Gamma Analysis Of Soil Samples

Calculation Sheet

$$pCi/gm = \frac{(R_s)(4.5\times10^{-1})}{(eff)(Wt_s)}$$

Where: R_s = 505 NCPM 21 Mar 66
R_{s+b} = 1280 cpm
R_b = 775 cpm
t_{s+b} = 900 min
t_b = 900 min
eff = 0.144 NCPM/dpm (^{137}Cs)
Wt_s = 240.8 gms

$$pCi/gm = \frac{(5.05\times10^{2}\ NCPM)(0.45\ pCi/dpm)}{(0.144\ NCPM/dpm)(2.408\times10^{2}\ gm)}$$

$$= 4.47\ pCi/gm$$

$$\%E = \frac{2\sqrt{\frac{1280}{900}+\frac{775}{900}}}{505}\times100 = 0.6\%$$

Activity Concentration Reported:

4.47 pCi/gm ± 0.6% @ 95% CL @ 21 Mar 66
Determined by Integral γ Analysis (0-3.0 MeV)

GAMMA Analysis of Air Particulate Monitor Samples

Calculation Sheet

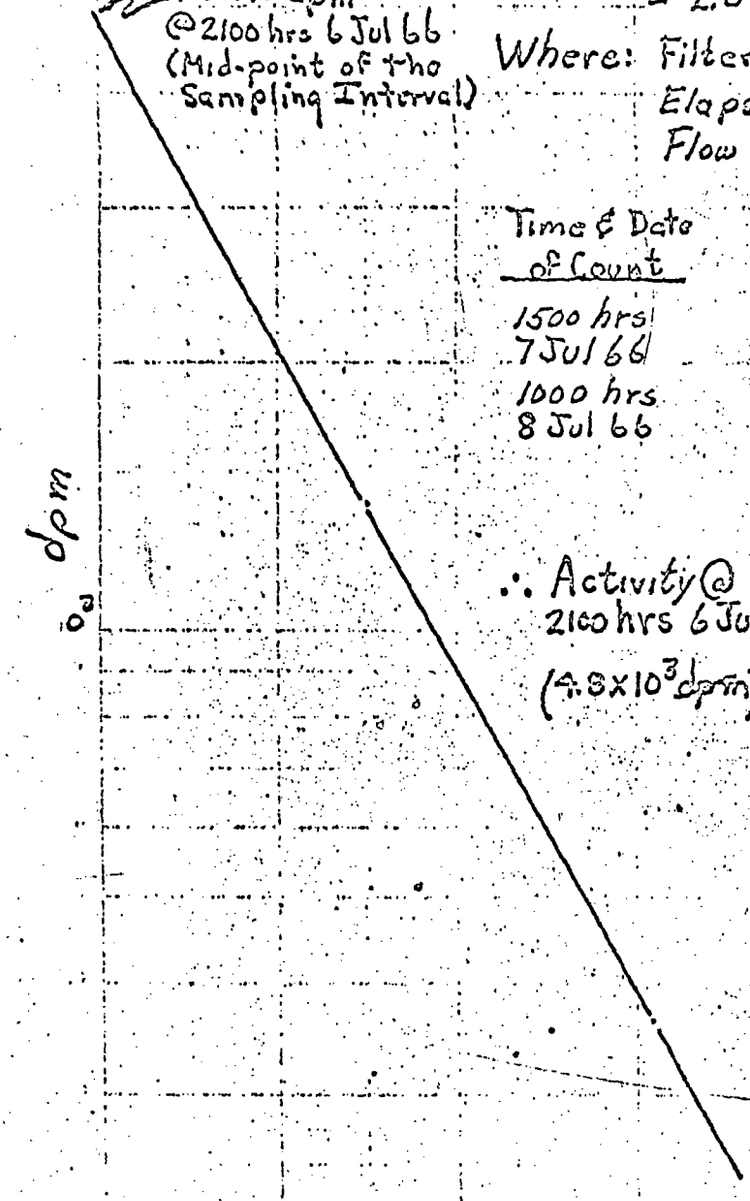
Volume @ 2100 hrs 6 Jul 66 $= (12.92\ hrs)\left(\frac{60\ min}{hr}\right)(9.2\ ft^3/min)\left(2.83\times10^4\ \frac{cc}{ft^3}\right)$

$= 2.02\times10^8\ cc$

Where: Filter "ON" @ 0905 hrs 6 Jul 66
Elapsed time to 2100 hrs 6 Jul 66 = 12.92 hrs
Flow Rate = 9.2 cfm

4.8×10^3 dpm @ 2100 hrs 6 Jul 66 (Mid-point of the Sampling Interval)

Time & Date of Count	MDA	Observed dpm
1500 hrs 7 Jul 66	144 dpm	1384 dpm
1000 hrs 8 Jul 66	142 dpm	362 dpm



∴ Activity @ 2100 hrs 6 Jul 66 =

$(4.8\times10^3\ dpm)(4.5\times10^{-7}\ \mu Ci/dpm)\left(\frac{1}{2.02\times10^8\ cc}\right)$

$= 1.07\times10^{-11}\ \mu Ci/cc$ JAB

Activity Concentration Reported:

$\simeq 1.07\times10^{-11}\ \mu Ci/cc$ @ 2100 hrs 6 Jul 66

Determined by Integral γ Analysis (0-3.0 MeV)

2100 hrs 6 Jul 66 — 2100 hrs 7 Jul 66 — 2100 hrs 8 Jul 66 — Elapsed Time

Apparent Age of Fission Products

Environmental Studies

Way-Wigner Formula

Calculation Sheet

$$t_1 = \frac{\Delta t_1}{\left\{\left(\frac{A_1}{A_2}\right)^{0.835} - 1\right\}}$$

Where:

t_1 = days ≡ Apparent Age at the Time of First Counting

Δt_1 = 6.72 days ≡ Time elapsed between 1st & 2nd Counts

A_1 = 8571 NCPM ≡ Activity at time of First Counting (Approximately 3 days after Collection.)

A_2 = 5662 NCPM ≡ Activity at time of Second Counting (Approximately 10 days after Collection.)

$$\text{Days} = \frac{6.72}{\left\{\left(\frac{8571}{5662}\right)^{0.835} - 1\right\}} = \frac{6.72}{1.413 - 1} = 16.3 \text{ days}$$

Time from first Count to detonation = 16.3 days

Time and date of First Count = 1520 hrs 25 May 66

Announced time of Chinese Test ≅ 9 May 66

Calculated time and date of Test ≅ 0800 9 May 66 (edt)

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Fission-Product Activity at Time of Collection
Environmental Studies

Calculation Sheet

Collected: 1515 hrs 25 May 66
1st Count: 0830 hrs 1 Jun 66

$$A_c = A_1\left(\frac{t_1}{t_1 - \Delta t_2}\right)^{1.2}$$

Where:

$\Delta t_2 = 6.7$ days $\equiv$ Time elapsed between Collection and first Counting

$A_1 = 9.65\ pCi/gm \equiv$ Activity at time of 1st Count

$t_1 = 23.0$ days $\equiv$ Apparent Age of Fission-Products at time of 1st Counting (Way-Wigner)

$A_c =$ ____ $pCi/gm \equiv$ Activity at time of Collection

$$\frac{pCi}{gm}@\ \substack{1515\ hrs \\ 25\ May\ 66} = 9.65\left(\frac{23.0}{23.0-6.7}\right)^{1.2} = 9.65(1.51) = 14.6\ \frac{pCi}{gm}$$

$$\%E = \frac{2\sqrt{\frac{6456}{10} + \frac{794}{10}}}{5662} \times 100 = 0.95\%$$

Where: $R_s = 5662$ NCPM @ 0830 hrs 1 Jun 66
$R_{s+b} = 6456$ cpm $t_{s+b} = 10$ min
$R_b = 794$ cpm $t_b = 10$ min

Activity Concentration Reported:

14.6 pCi/gm ± 0.95% @ 95% C.L. @ 1515 hrs 25 May 66
Determined by Integral γ Analysis (0-3.0 Mev)

Determination of Fission-Product Activity
Environmental Studies
(Koval Method)

Calculation Sheet

$$C_{LL} = \frac{C_2 - C_1 e^{-\lambda \Delta t}}{1 - e^{-\lambda \Delta t}}$$

Where:

C_{LL} = pCi ≡ Gross Long Lived Activity

C_1 = 202 pCi ≡ Activity Observed at time t (Approximately 4 hrs after Collection)

C_2 = 108 pCi ≡ Activity Observed at time t_2 (Approximately 24 hrs after C_1)

t = 1430 hrs 25 May 66 ≡ Date and time at which C_1 was measured

t_2 = 0900 hrs 26 May 66 ≡ Date and time at which C_2 was measured

Δt = 18.5 hrs ≡ Elapsed time between C_1 and C_2.

λ = 0.0654 ≡ Decay Constant for Thorium B (^{212}Pb) = 0.693/10.6 hrs

$$\therefore pCi = \frac{108 - 202e^{-(0.0654)(18.5)}}{1 - e^{-(0.0654)(18.5)}}$$

$$= \frac{108 - 202e^{-1.21}}{1 - e^{-1.21}} = \frac{47.8}{.702} = 68 \text{ pCi}$$

Volume of air collected = 167 M^3

∴ The Concentration of Long Lived Nuclides in Air at 1430 hrs 25 May 66 = 68 pCi/167 M^3 = 0.41 pCi/M^3 or 4.1×10^{-13} uCi/cc

Note: Determination of this activity was made by Integral γ Analysis (0-3.0 Mev). The activity is a result of the Chinese Test on 9 May 1966

HEALTH PHYSICS
WALTER REED ARMY MEDICAL CENTER
Washington, D.C. 20012

*
HSW-YHP SOP
Number 2-2

7 February 1977

RADIOACTIVITY ANALYSIS LABORATORY

1. Purpose. To establish guidelines for the radioactivity analysis laboratory (R/A Lab), Health Physics (HP), Walter Reed Army Medical Center (WRAMC) in order to insure the orderly and continuous operation of the laboratory.

2. Mission. To assist the Chief, Nuclear Laboratory and Technical Service Branch (Ch, NL&TS Br), HP, WRAMC, in the successful fulfillment of the overall mission of the Branch by providing the necessary technical and administrative ability to determine the identity and quantity of radioactivity in environmental samples, wipe tests, reactor effluents, reactor pool water, and other special analyses as required.

3. Routine Duties.

a. General. Routinely the Ch, R/A Lab, will evaluate and report sample analyses directly to the requestor. However, when analyses indicate abnormal samples or contamination levels, he will consult with the Ch, NL&TS Br, prior to making a final report to the requestor.

b. Daily Calibration of Counting Equipment. A record of all calibrations, malfunctions and repairs will be kept on file. Calibration sources and backgrounds will be counted daily on routinely used equipment. All routinely used equipment will normally be left in the operating mode to insure its stability and reliability.

(1) NS 4096 Channel Analyzer. See manufacturer's literature for operating instructions.

(a) The integral gamma efficiencies for routine geometrics are arrived at from the 137-Cesium point source efficiency using an empirically determined correlation factor.

(b) Energy calibration - 0-2 MEV full range.

(c) Performance check.

(2) Beckman Liquid Scintillation System. See manufacturer's literature for operating instructions.

* This SOP supersedes HP SOP Number 2-2, 10 June 1974.

2nd 8

(a) This instrument is normally calibrated by running a set of quenched standards and plotting the calculated efficiencies against the automatic quench correction (AQC) factor, (the decimal value following the χ on the printout).

(b) Efficiency for each sample is determined by going to the calibration curve for that type of sample and taking the efficiency as that point where the AQC factor intercepts the efficiency curve.

(3) Beckman WIDEBETA II, Beta Counting System. See literature for operating instructions.

(a) Net beta efficiency is calibrated from a 14-Carbon standard.

(b) Alpha efficiency is calculated from a 210-Polonium standard.

c. Periodic Calibration (Determined by Chief, NL&TS Br)

(1) CHI Squared (χ^2) statistical evaluation of each laboratory instrument in daily use for nuclear counting purposes.

(2) Determination of the resolution of the 4x4" Sodium Iodide crystal and phototube assembly (4x4" NaI Xtal).

d. Voltage plateaus and χ^2 statistical evaluations will be performed as required, and after equipment repairs or component changes.

4. Laboratory Procedures and Work Load.

a. General.

(1) For convenience, 10 minute counting times are specified throughout these procedures; however, in cases where a low sample-to-background ratio exists and a small counting error is necessary, the counting time will be extended to insure statistical validity of the radioassay.

(2) Abnormal as used in these procedures is defined as any sample exceeding the radiation protection guidelines (RPG) and/or contamination levels or that has a gamma spectrum with a statistically significant photopeak(s) that has not been previously identified and whose origin has not been explained to the satisfaction of the Chief, NL&TS, HP, WRAMC.

b. Daily Samples.

(1) DORF Pool Water

(a) Action. Allow sample to decay for approximately 24 hours after collection to allow the 41-Argon to decay away, thus eliminating its interference in the detection of low levels of fission products.

1 Do a 20-minute integral gamma count on a Marinelli beaker filled to 3 liters to establish the background counting rate of the 4x4" NaI Xtal.

2 Do a 20-minute integral gamma count of 2500 to 3000 ml aliquot of the sample.

3 Save all abnormal samples for follow-up decay study.

(b) Calculations - See HP SOP 1-2, Counting Procedures.

(c) Follow-up - Next day.

1 Do a 20-minute integral gamma count of the sample if required for decay purposes.

2 Identify isotopes present, if possible.

(d) Disposition of Sample - Discard the sample to the sewer after the activity decays to approximately 10^{-6} μCi/ml, making the appropriate entries in the Waste Disposal Log.

(2) Air Particulate Monitor - Reactor Air Samples.

(a) Immediate Action

1 Do a 10-minute integral gamma count on the 4x4" NaI Xtal with the 1/4" lucite beta absorber in place to establish the background counting rate.

2 Do a 10-minute integral gamma count of each filter at least five (5) hours after sample cut-off (to allow for decay of short-lived Radon components).

3 Save samples for follow-up.

(b) Calculations - See HP SOP 1-2, Counting Procedures.

(c) Follow-up - Next day.

1 Do a 10-minute integral gamma count on the 4x4" NaI Xtal with the 1/4" lucite beta absorber in place to establish the background counting rate.

2 Do a 10-minute integral gamma count of each filter at least 24 hours after sample cut-off (to allow for decay of long-lived Thoron components).

3 Save Samples only in cases where further analyses are indicated.

(d) Disposition of Samples

1 Routine Samples - Discard the samples after analysis.

2 Abnormal Samples - Discard the samples only after completion of analysis in accordance with current procedures.

(3) Wipes

(a) Immediate Action

1 Beta contamination suspected

a Select a calibration standard in the energy range of the suspect isotope and determine the counting efficiency (See HP SOP 1-2, Counting Procedures, para 4b).

b Set the wipes up for WIDEBETA II system. Initiate 10-minute counts on samples.

c If contamination is noted on any wipe, remove it from its planchet, place it in a paper envelope, and count it on the 4x4" NaI Xtal to determine the amount of gamma activity present and its identity if it is a gamma emitter. Wipes are counted with the 3/4"x4" diameter lead shield on top of the wipe.

2 Gamma contamination suspected - Proceed as in c above.

3 Alpha contamination suspected - Adjust the counting mode to Alpha Mode (WIDEBETA II).

(b) Calculations - See HP SOP 1-2, Counting Procedures.

(c) Follow-up. Notify the requestor by telephone of any wipes found to be of greater activity than the contamination level, giving the activity (in dpm) and identity of the contaminating isotope, if known.

(d) Disposition of Sample

1 Discard all noncontaminated wipes.

2 Hold the contaminated wipes until a report is made to the requestor, then discard them in accordance with current procedures.

(4) Special Samples - From time to time, special samples will be received for evaluation. These will be treated in accordance with HP SOP 1-2, Counting Procedures, and with the priority determined by the Chief, NL&TS Br, HP, WRAMC.

c. Samples Collected

(1) Reactor Effluent Water Samples (collected as required for analysis prior to release to the unrestricted area).

(a) Immediate Action

1 Do a 10-minute integral gamma count on each sample. A Marinelli beaker with one plastic bag inserted will be counted for 10 minutes to establish the background counting rate on the 4x4" NaI Xtal. A background will be required for each sample analyzed.

2 Do a 10-minute integral gamma count of total sample minus one (1) liter (for reduction in accordance with ANNEX A to this SOP, an evaluation of the remaining volume is usually between 1500 and 1800 ml).

3 Save all abnormal samples.

4 Proceed with preparation of the one (1) liter aliquot of each sample for a net $\beta + \alpha$ analysis (see ANNEX A to this SOP). Counting time should be sufficient to provide a counting error not greater than 25% at the 95% confidence level when assaying samples with an activity greater than 1×10^{-6} mCi/ml.

(b) Calculations - See HP SOP 1-2, Counting Procedures.

(c) Follow-up. Abnormal samples will be analyzed in detail for determination of the half-life and identification of the nuclides present.

(d) Disposition of Samples. Discard to sewer (liquid samples) or non-burnable waste (solid samples) when analysis is completed in accordance with current procedures.

(2) Gas Samples (collected as required by the Health Physics Officer, WRAMC, or the Physicist in Charge, DORF.

(a) Immediate Action

1 Do a 10-minute integral gamma count of an empty sample container to establish the background counting rate on the 4x4" NaI Xtal with the 1/4" lucite beta absorber in place.

2 Perform a 10-minute integral gamma count on each sample.

(b) Calculations - See HP SOP 1-2, Counting Procedures.

(c) Follow-up. Abnormal samples will be analyzed in detail for identification of all nuclides present.

(d) Disposition of Samples. As most samples of this type will be short-lived, samples will be held for decay.

(3) Soil Samples (Collected twice annually).

(a) Immediate Action

1 Do a 10-minute integral gamma count of an empty sample container to establish the background counting rate on the 4x4" NaI Xtal with the 1/4" lucite beta absorber in place.

2 Perform a 10-minute integral gamma count on each sample.

3 Prepare an X-Y plot on each sample.

(b) Calculations - See HP SOP 1-2, Counting Procedures.

(c) Follow-up. Abnormal samples will be analyzed in detail for determination of the half-life and identification of the nuclides present.

(d) Disposition of Samples. Discard all samples to waste upon completion of analyses.

(4) Flora Samples - Grass Cuttings (collected as required by the Chief, NL&TS Br, HP, WRAMC).

(a) Immediate Action

1 Do a 10-minute integral gamma background count on the 4x4" NaI Xtal with the 1/4" lucite beta shield in place.

2 Do a 10-minute integral gamma count on each sample.

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3 Prepare an X-Y plot of each sample.

(b) Calculations - HP SOP 1-2, Counting Procedures.

(c) Follow-up. Abnormal samples will be analyzed in detail for determination of the half-life and identification of the nuclides present.

(d) Disposition of Samples. Discard all samples upon completion of analyses.

(5) Snow Samples (collected as required by the Chief, NL&TS Br, HP, WRAMC). Thaw and treat as in para 4c(1), above.

5. Radiochemistry. The Chief, R/A Lab, will, as required

a. Prepare calibration standards for use in the laboratory.

b. Perform necessary radiochemical separations using appropriate technical and laboratory procedures on file at HP, WRAMC.

c. Continuously evaluate and improve the laboratory techniques in keeping with technical advances made in the field.

6. Maintenance of Supplies and Equipment. The Chief, R/A Lab, will

a. Order chemicals and laboratory equipment needed through HP Supply.

b. Coordinate equipment maintenance with the HP Instrument Shop. All radiation detection instruments require a quarterly maintenance check.

c. Perform the following preventive maintenance:

(1) Fume hood blower shaft - Grease as required.

(2) Air compressor - Maintain oil level.

(3) Vacuum pump - Maintain oil level.

(4) Change fume hood prefilter as required.

d. Maintain inventory of assigned equipment.

7. Records. The Chief, R/A Lab, will insure that the following records are properly maintained:

a. Logs

(1) Sample Data Log - All incoming samples will be recorded and assigned a number in sequence from this Log. A new series of numbers will be started at the beginning of each calendar year.

(2) Waste Disposal Log - Record the discharge of liquid radioactive materials to the sewer.

b. Files

(1) Reports of Special Laboratory Analyses for Reference - Papers on specific projects which will be useful as reference sources will be kept.

(2) Quality Assurance Papers, daily check, calibrations, voltage plateaus, maintenance reports, etc. for the laboratory counting instrumentation will be kept.

(3) Technical Data - Books and papers pertaining to laboratory operations and assigned equipment will be kept.

(4) Manufacturer's Data - Instructional material on the use and maintenance of the laboratory equipment will be maintained.

(5) Environmental Monitoring Data

(a) Folder for completed WRAMC Forms 708 (Health Physics Survey Work Sheet) for Bldgs 188 and 149-A will be kept (COFF 1 yr).

(b) Folder for Special Analyses (COFF 1 yr).

(6) Maintaining Register - Data pertinent to the laboratory counting instrumentation that is not suitable for entry into the Daily Performance Log will be kept and maintained as a permanent history of the equipment.

(7) Calibration Source Data Sheets - Radiochemical Standards - Data pertaining to the preparation and use of radiochemicals will be kept but will be cut off when the isotope is depleted or discarded.

c. Chemical Inventory - 3"x5" Card File. Record receipt and use of chemical stores to maintain a constant inventory of these supplies.

7 February 1977

8. Reports. The Chief, R/A Lab will insure that the Reports of Analysis (WRAMC Forms 708) are completed and forwarded to proper authorities without delay.

a. Reports for non-routine analyses will be prepared and forwarded as directed by the Chief, NL&TS Br, HP, WRAMC.

b. A sample number is assigned to each sample and appropriate entries are made into the Sample Data Log. This number will then accompany the sample throughout its evaluation in the laboratory. The time and date of sample receipt will be stamped on all copies of the Form 708.

W. LARRY PETCOVIC, JR
CPT, MSC
Asst. Health Physics Officer
WRAMC

ANNEX A to
HP SOP 2-2

7 February 1977

SAMPLE PREPARATION
NET β + γ ACTIVITY IN WATER

1. Purpose. The purpose of this ANNEX is to provide a standard method for the preparation of water samples received at the R/A Lab, HPO, WRAMC, for Net β + γ radioanalysis.

2. Responsibility. The Chief, R/A Lab, will insure that all samples are processed for analysis without delay and provide a report of this analysis as quickly as possible to the requestor.

3. Water Samples - Net β + γ Analysis Requested.

a. Agitate the sample and decant a one (1) liter aliquot from the total volume of the sample received.

b. Filter this aliquot through a strip of FINE quality filter paper on the "FILTER-FUGE" filtering apparatus; repeat as necessary to obtain a clear liquid.

c. Carefully remove the filter paper strip(s), place them into a porcelain crucible and allow to dry.

d. Carefully pour the clean filtrate into a clear water concentrator lightly greased with DOW-CORNING II silicon compound. Remove the paper tab from the planchet in the bottom of the concentrator before adding the sample.

e. Adjust the VARIAC for 85 volts, place the switch on the ON position and leave until the sample is evaporated.

f. When the sample is dried and cool, remove the planchet from the concentrator and place it in a 2"x 1/4" wall stainless steel planchet.

g. Place the crucible with the filter strip(s) in the fume hood, saturate the paper strip(s) with ACETONE, and IGNITE it (them). Repeat as necessary to completely reduce the paper strip(s) to an ash.

h. Using small amounts of Nitric Acid and deionized water, quantitatively transfer the ash to the planchet (f, above) and dry under a heat lamp or on a hot plate.

I. When the sample is dried and cool, it is ready for counting on the Beckman WIDEBETA II counting system.

HEALTH PHYSICS
WALTER REED ARMY MEDICAL CENTER
Washington, D.C. 20012

HSWP-QHP
*MEMO Number 14

28 February 1978

GAS CHROMATOGRAPH OPERATING PROCEDURES

1. PURPOSE. To outline routine and emergency operating procedures for use with chromatography detectors equipped with radioactive sources.

2. SCOPE. This MEMO applies to all persons occupying the area designated for use of gas chromatograph detectors.

3. RESPONSIBILITIES.

a. The gas chromatograph detector shall be used only by, or under the supervision of the Principal User. The Principal User is responsible for:

(1) Control, safe operation and security of the gas chromatograph unit.

(2) Training selected individuals in its safe use and operation in accordance with the procedures outlined herein.

(3) Insuring that WRAMC Regulation 40-10 and other pertinent documents are available at all times and are complied with.

(4) Promptly reporting any accident that could result in an unsafe condition to the WRAMC Health Physics Officer (427-5107).

b. WRAMC Health Physics is responsible for:

(1) Conducting routine radiation protection surveys, periodic inspections and leak tests.

(2) Providing personnel dosimetry for all personnel as needed.

(3) Providing routine bioassay studies as needed.

(4) Instructing operating personnel in the Health Physics aspects of gas chromatography.

c. Individual operators are responsible for:

(1) Operating the unit in a safe manner at all times.

*This MEMO supersedes HP MEMO Number 14, Gas Chromatograph Operating Procedures, dtd 10 June 1974.

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Incl 9

(2) Being familiar with the contents of these instructions, WRAMC Regulation 40-10, and other data as prescribed by the Principal User.

(3) Reporting all accidents or abnormal operating conditions that could result in an unsafe condition or exposure of personnel promptly to the Principal User.

4. EMERGENCY PROCEDURES.

a. In the event of an emergency, the following individuals will be notified after turning the power to the instrument off.

(1) The Principal User.

(2) Health Physics Officer, WRAMC (427-5107).

(3) Charge of Quarters of appropriate building(s).

b. In the event of FIRE in the room, the following will be done immediately:

(1) Notify the WRAMC Fire Department (Main Section - 576-3317; Forest Glen Section - 427-5317).

(2) Notify the Principal User.

(3) Notify the Health Physics Officer, WRAMC (427-5107).

(4) Notify the Charge of Quarters of appropriate building(s).

(5) The senior individual at the site should clear the area of personnel and attempt to turn off the power to the instrument.

c. Power Failure. In the event of a power failure, no danger exists.

5. GAS CHROMATOGRAPH DETECTORS. Some of the detectors presently used at WRAMC employ the use of a radioactive source as a supply of electrons to effect the detection of gasses according to their molecular weights and holdup times.

a. Tritium Foil. Tritium is usually bound to a copper or stainless steel foil as titanium tritide. The binding agent may begin to break

HEALTH PHYSICS
WALTER REED ARMY MEDICAL CENTER
Washington, D.C. 20012

HSWP-QHP
SOP Number 4-2

31 October 1977

PROCEDURES FOR RECEIVING RADIOACTIVE MATERIAL SHIPMENTS DURING NON-DUTY HOURS

1. GENERAL:

Certain shipments of radioactive materials must be tested for radioactive contamination within a specified time of their receipt by the licensee. This SOP describes procedures to accomplish this to satisfy requirements of 10 CFR 20.205.

2. RESPONSIBILITIES:

a. The Military Police, FGS, will receive all radioactive material shipments for WRAMC during non-duty hours. Military Police responsibilities and procedures are specified in Appendix A to this SOP.

b. The RAMT Coordinator on call will monitor shipments received by the Military Police during non-duty hours. The RAMT Coordinator's responsibilities are outlined in the following paragraphs.

3. SHIPMENT MONITORING:

a. The RAMTCO will call the FGS Military Police (427-5348/5107) at least every eighteen hours during non-duty hours and obtain a list of isotopes received during that period. The following shipments are not required to be checked for contamination:

(1) Unlabeled packages which do not specify isotope and activity.

(2) Packages containing no more than the exempt quantities shown in the folling table:

TABLE OF EXEMPT QUANTITIES

Transport Group*	EXEMPT Quantity Limit (In millicuries)
I	0.01
II	0.1
III	1.0
IV	1.0
V	1.0
VI	1.0
VII	25,000.0

* The transport group may be determined from Appendix B to this SOP.

This SOP Supersedes SOP 4-2, dated 10 March 1975.

encl 10

(3) Packages containing no more than 10 mCi of radioactive material consisting solely of 3-H, 14-C, 35-S or 125-I.

(4) 99 Mo/99 mTc generators.

(5) Packages containing only radionuclides with half-lives of less than 30 days and a total activity of 100 mCi or less. These radionuclides are indicated by an "X" in Appendix B.

b. Should any of the packages not specifically exempted by para 3a, above, contain 3-H, 51-Cr, 125-I, call the person assigned to the Radioisotopes Analysis Laboratory or the NCOIC, NL&TS Branch.

c. All other packages will be processed by the RAMTCO as follows:

(1) Obtain paper towel smear (available at Bldg 149-A) from the surface of each package to be processed. Be careful to smear the entire package surface, identify each smear and avoid cross contamination.

(2) Replace all packages in the refrigerator.

(3) Take a one minute count on the smears on the proportional counter in Room 9, Bldg 188.

(4) Call the NCOIC, NL&TS, or any NCO or Officer assigned to Health Physics if any smear yields $\geq$ 1000 gross counts per minute. Smears yielding less than 1000 gross counts per minute require no action.

2 Appendices
A - MP responsibilities & procedures
B - Radioactive Material Transport Groupings

BOBBY R. ADCOCK
LTC, MSC
Health Physics Officer

APPENDIX A

RECEIPT OF RADIOACTIVE MATERIAL SHIPMENTS BY MILITARY POLICE DURING NON-DUTY HOURS

1. Federal law (10 CFR 20.205) requires that a certain category of radioactive material shipments be monitored within eighteen (18) hours of receipt. To meet this requirement, it is requested that radioactive material shipments received by Military Police during non-duty hours be processed as follows:

a. MP personnel receiving shipments will annotate the shipping receipt with his/her name, time and date delivered.

b. Receipts will be maintained at the FGS MP Station until picked up by Health Physics on a weekly basis.

c. The material will be placed in the marked refrigerator in the Radioactive Material Storage Bunker, Bldg 149A, FGS.

2. The formal Log Book used in the past will be discontinued.

3. The Health Physics RAMTCO (RAMTCO) will call as required to determine if shipments have been received that require monitoring. The MP will relay requested data from the shipping documents (receipts).

4. Questions should be referred to the Radioactive Material Control Office (Mr. Emmett J. Crossley or SFC Robert L. Black, 427-5161/5107).

APPENDIX B

RADIOACTIVE MATERIAL TRANSPORT GROUPINGS

Element*	Radionuclide***	Group
Actinium (89)	Ac 227	I
	Ac 228	I
Americium (95)	Am 241	I
	Am 243	I
Antimony (51)	Sb 122	IV
	Sb 124	III
	Sb 125	III
Argon (18)	Ar 37	VI
	Ar 41	II
	Ar 41 (uncompressed).**	V
Arsenic (33)	As 73	IV
	As 74	IV
	As 76	IV
	As 77	IV
Astatine (85)	At 211	III
Barium (56)	Ba 131	IV
	Ba 133	II
	Ba 140	III
Berkelium (97)	Bk 249	I
Beryllium (4)	Be 7	IV
Bismuth (83)	Bi 206	IV
	Bi 207	III
	Bi 210	II
	Bi 212	III
Bromine (35)	Br 82	IV
Cadmium (48)	Cd 109	IV
	Cd 115 m	III
	Cd 115	IV
Calcium (20)	Ca 45	IV
	Ca 47	IV
Californium (98)	Cf 249	I
	Cf 250	I
	Cf 252	I
Carbon (6)	C 14	IV
Cerium (58)	Ce 141	IV
	Ce 143	IV
	Ce 144	III
Cesium (55)	Cs 131	IV
	Cs 134 m	III
	Cs 134	III
	Cs 135	IV
	Cs 136	IV
	Cs 137	III
Chlorine (17)	Cl 36	III
	Cl 38	IV
Chromium (24)	Cr 51	IV
Cobalt (27)	Co 56	III
	Co 57	IV
	Co 58 m	IV
	Co 58	IV
	Co 60	III
Copper (29)	Cu 64	IV
Curium (96)	Cm 242	I
	Cm 243	I
	Cm 244	I
	Cm 245	I
	Cm 246	I
Dysprosium (66)	Dy 164	III
	Dy 165	IV
	Dy 166	IV
Erbium (68)	Er 169	IV
	Er 171	IV
Europium (63)	Eu 150	III
	Eu 152 m	IV
	Eu 152	III
	Eu 154	II
	Eu 155	IV
Fluorine (9)	F 18	IV
Gadolinium (64)	Gd 153	IV
	Gd 159	IV
Gallium (31)	Ga 67	III
	Ga 72	IV
Germanium (32)	Ge 71	IV
Gold (79)	Au 193	III
	Au 194	III
	Au 195	III
	Au 198	IV
	Au 198	IV
	Au 199	IV

Element*	Radionuclide***	Group
Hafnium (72)	Hf 181	IV
Holmium (67)	Ho 166	IV
Hydrogen (1)	H 3 (see tritium)	
Indium (49)	In 113 m	IV
	In 114 m	III
	In 115 m	IV
	In 115	IV
Iodine (53)	I 124	III
	I 126	III
	I 129	III
	I 131	III
	I 132	IV
	I 133	III
	I 134	IV
	I 135	IV
Iridium (77)	Ir 190	IV
	Ir 192	III
	Ir 194	IV
Iron (26)	Fe 55	IV
	Fe 59	IV
Krypton (36)	Kr 85 m	III
	Kr 85 m (uncompressed).**	V
	Kr 85	III
	Kr 85 (uncompressed).**	VI
	Kr 87	II
	Kr 87 (uncompressed).**	V
Lanthanum (57)	La 140	IV
Lead (82)	Pb 203	IV
	Pb 210	II
	Pb 212	II
Lutecium (71)	Lu 172	III
	Lu 177	IV
Magnesium (12)	Mg 28	III
Manganese (25)	Mn 52	IV
	Mn 54	IV
	Mn 56	IV
Mercury (80)	Hg 197 m	IV
	Hg 197	IV
	Hg 203	IV
Mixed fission products MFP		II
Molybdenum (42)	Mo 99	IV
Neodymium (60)	Nd 147	IV
	Nd 149	IV
Neptunium (93)	Np 237	I
	Np 239	I
Nickel (28)	Ni 59	III
	Ni 63	IV
	Ni 65	IV
Niobium (41)	Nb 93 m	IV
	Nb 95	IV
	Nb 97	IV
Osmium (76)	Os 185	IV
	Os 191 m	IV
	Os 191	IV
	Os 193	IV
Palladium (46)	Pd 103	IV
	Pd 109	IV
Phosphorus (15)	P 32	IV
Platinum (78)	Pt 191	IV
	Pt 193	IV
	Pt 193 m	IV
	Pt 197 m	IV
	Pt 197	IV
Plutonium (94)	Pu 238 (F)	I
	Pu 239 (F)	I
	Pu 240	I
	Pu 241 (F)	I
	Pu 242	I
Polonium (84)	Po 210	I
Potassium (19)	K 42	IV

Element*	Radionuclide***	Group
	K 43	III
Praseodymium (59)	Pr 142	IV
	Pr 143	IV
Promethium (61)	Pm 147	IV
	Pm 149	IV
Protactinium (91)	Pa 230	I
	Pa 231	I
	Pa 233	II
Radium (88)	Ra 223	II
	Ra 224	II
	Ra 226	I
	Ra 228	I
Radon (86)	Rn 220	IV
	Rn 222	II
Rhenium (75)	Re 183	IV
	Re 186	IV
	Re 187	IV
	Re 188	IV
	Re Natural	IV
Rhodium (45)	Rh 103 m	IV
	Rh 105	IV
Rubidium (37)	Rb 86	IV
	Rb 87	IV
	Rb Natural	IV
Ruthenium (44)	Ru 97	IV
	Ru 103	IV
	Ru 105	IV
Ruthenium (44)—Con.	Ru 106	III
Samarium (62)	Sm 145	III
	Sm 147	III
	Sm 151	IV
	Sm 153	IV
Scandium (21)	Sc 46	III
	Sc 47	IV
	Sc 48	IV
Selenium (34)	Se 75	IV
Silicon (14)	Si 31	IV
Silver (47)	Ag 105	IV
	Ag 110 m	III
	Ag 111	IV
Sodium (11)	Na 22	III
	Na 24	IV
Strontium (38)	Sr 85 m	IV
	Sr 85	IV
	Sr 89	III
	Sr 90	II
	Sr 91	III
	Sr 92	IV
Sulphur (16)	S 35	IV
Tantalum (73)	Ta 182	III
Technetium (43)	Tc 96 m	IV
	Tc 96	IV
	Tc 97 m	IV
	Tc 97	IV
	Tc 99 m	IV
	Tc 99	IV
Tellurium (52)	Te 125 m	IV
	Te 127 m	IV
	Te 127	IV
	Te 129 m	III
	Te 129	IV
	Te 131 m	III
	Te 132	IV
Terbium (65)	Tb 160	III
Thallium (81)	Tl 200	IV
	Tl 201	IV
	Tl 202	IV
	Tl 204	III
Thorium (90)	Th 227	II
	Th 228	I
	Th 230	I
	Th 231	I
	Th 232	III
	Th 234	II
	Th Natural	III
Thulium (69)	Tm 168	III
	Tm 170	III
	Tm 171	IV

See footnotes at end of table.

Element*	Radionuclide***	Group
Tin (50)	Sn 113	IV
	Sn 117 m	III
	Sn 121	III
	Sn 123	IV
Tritium (1)	H 3	IV
	H 3 (as a gas, as luminous paint, or absorbed on solid material).	VII
Tungsten (74)	W 181	IV
	W 185	IV
	W 187	IV
Uranium (92)	U 230	II
	U 232	I
	U 233 (F)	II
	U 234	II
	U 235 (F)	III
	U 236	II
	U 238	III
	U Natural	III
	U Enriched (F)	III
	U Depleted	III
Vanadium (23)	V 48	IV
	V 49	III
Xenon (54)	Xe 125	III
	Xe 131 m	III
	Xe 131 m (uncompressed).**	V
	Xe 133	III
	Xe 133 (uncompressed).**	VI
Xenon (54)—Con.	Xe 135	II
	Xe 135 (uncompressed).**	V
Ytterbium (70)	Yb 175	IV
Yttrium (39)	Y 88	III
	Y 90	IV
	Y 91 m	III
	Y 91	III
	Y 92	IV
	Y 93	IV
Zinc (30)	Zn 65	IV
	Zn 69 m	IV
	Zn 69	IV
Zirconium (40)	Zr 93	IV
	Zr 95	III
	Zr 97	IV

*Atomic number shown in parentheses.
** Uncompressed means at a pressure not exceeding one atmosphere.
*** Atomic weight shown after the radionuclide symbol.
m—Metastable state.
(F) Fissile material.

down and allow liberation of tritium at temperatures as low as 150° C. The gas chromatograph units should have a built in thermocouple to shut the unit off at 220°C since the tritium would probably be entirely evolved at this temperature.

(1) Vented Detectors. Some of the detectors are equipped with exit ports for venting potentially contaminated gases. These detectors while in use should be vented to a sink under running water or into an operating Health Physics approved fume hood.

(2) Non-Vented Detectors. These detectors have no provisions for control of potentially contaminated exhaust gases and should be used in an operating Health Physics approved fume hood. The gases in these detectors are forced through a rubber leak seal at the end of the cylinder. These detector cylinder caps become highly contaminated on the inside surface and shall not be displaced from their cylinders without Health Physics inspection and approval.

b. ^{226}Ra, ^{210}Pb, ^{90}Sr and ^{63}Ni containing detectors. Temperatures below 500°C are not sufficient to break down the binding of these metallic isotopes to the detector foils. Therefore moderately high temperatures are not a consideration in their operation. These sources may, however, be partially exposed when dismantling the detector unit; accordingly detector units shall not be dismantled without Health Physics approval.

BOBBY R. ADCOCK
LTC, MSC
Health Physics Officer

HEALTH PHYSICS
WALTER REED ARMY MEDICAL CENTER
WASHINGTON, D.C. 20012

HSW-YHP
*SOP
Number 2-5

17 January 1977

HEALTH PHYSICS CALIBRATION RANGE

1. Purpose.

a. To insure the safe operation and control of the Health Physics Calibration Range by delegating responsibilities to specific sections at Health Physics, WRAMC.

b. To outline the routine and emergency procedures to be followed by Health Physics personnel at the calibration range.

2. Scope. This SOP pertains to all personnel entering the Health Physics Instrument Repair and Calibration Facility.

3. Responsibilities.

a. The Chief, NL&TS Branch, HP, WRAMC, is responsible for:

(1) Control, safe operation, and security of the calibration range.

(2) Ensuring that the range is used only for those purposes approved by WRAMC Radioisotope Committee, and the HPO.

(3) Ensuring that authorized persons are familiar with calibrating sources.

(4) Ensuring that this SOP, WR 40-10, and any other pertinent Instructions are posted in the HP Instrument Repair and Calibration Facility.

(5) Ensuring a personnel dosimetry program, to include at least one whole body film badge and one wrist film badge, for all persons who use the calibration range is in effect.

(6) Ensuring that the Health Physics calibration range will be used only by, or under the supervision of those individuals so designated by the WRAMC Health Physics Officer.

b. The Chief, R&S Branch, HP, WRAMC, is responsible for:

(1) Ensuring that leak test of the sources and routine radiation protection surveys are made in the HP Instrument Repair and Calibration Facility.

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*This SOP supersedes SOP Number 2-5, 19 December 1972

(2) Maintaining the WRAMC Authorization for the Health Physics Instrument Repair and Calibration Facility's use of radioactive materials.

(3) Initiating all correspondence reports with USAEC concerning the license governing instrument section sources or their use on the calibration range.

(4) Calibration of 137-Cs Range.

c. Authorized operators of the calibration range are responsible for:

(1) Using the calibration range in the safest manner at all times.

(2) Knowing and understanding the contents of WR 40-10, this SOP, and any other pertinent regulations prescribed by the Health Physics Officer.

(3) Securing all sources when not in use.

(4) Immediately reporting any accident, malfunction, or other unplanned occurrence to the Health Physics Officer (X5107 or X5161).

4. Operating Procedures.

a. Before using the calibration range, note the reading of the Area Monitor located in the center of the range. If it reads 1 mR/hr or more, immediately notify HPO (X5107).

b. Insure that the fail safe system is operational. Set mechanical timer to no longer than 30 minutes.

c. While working on the calibration range continually monitor the radiation field with a Victoreen Model 808 B Area Monitor, or equivalent.

d. All personnel will wear a $\beta\gamma$ wrist and a $\beta\gamma$ whole body film badge as well as a self-reading pocket dosimeter when working around or with the calibration range.

e. When using the 137-Cs Irradiator, at least one operator and one other individual must be present. Extreme caution will be observed to avoid unnecessary personnel exposure from the primary beam.

f. All sources should be secured immediately after use.

5. Emergency Procedures.

a. In the event of fire the following persons shall be notified and the following action taken:

(1) Fire Department, Forest Glen (X5317)

(2) Health Physics Officer (X5107)

(3) The senior individual will clear all other persons from the area, attempt to secure the sources, and attempt to extinguish the fire if practical.

b. In the event of a power failure secure all sources.

6. Special Operating Conditions.

a. Following a fire or other incident, the calibration range will not be used until a radiation survey has been conducted by Health Physics.

b. Under No circumstances shall explosives or flammable materials be irradiated.

c. Under No circumstances shall the calibration range be used for purposes other than calibration of WRAMC Instruments without the prior written consent of the HPO, WRAMC.

d. After duty hours, the calibration sources will be locked, the calibration room will be locked and both sets of keys will be kept in the key cabinet in Room 2, Bldg 188, Forest Glen Section.

7. Reference. WRAMC Regulations 40-10.

BOBBY R. ADCOCK
LTC, MSC
Health Physics Officer
WRAMC

NUCLEAR MEDICINE SERVICE
DEPARTMENT OF RADIOLOGY
WALTER REED ARMY MEDICAL CENTER

* Technical Procedure
Number NM-1

3 January 1978

TECHNICAL PROCEDURE FOR ASSAY OF 99-Mo CONTAMINATION OF 99m-Tc

1. PURPOSE: This technical procedure provides a method for the determination of 99-Mo content and the calibration of 99m-Tc for human use.

2. INSTRUMENTATION: The thyroid uptake system consisting of 2" x 2" sodium iodide (th) crystal probe and a scintillation spectrometer will be used for all measurements.

3. QUALITY CONTROL: Routine practice has been established for daily checks of voltage calibration, linearity, efficiency and background.

4. MATERIALS: The lead "pig" labeled "For use in determining 99-Mo contamination in 99m-Tc" should be used. This pig has side wall shielding of 2.5 cm of lead. The 137-Cs standard source calibrated as 113.7 microcuries of 99-Molybdenum is used as a standard.

5. PROCEDURE:

a. Step #1: Set spectrometer settings for 99-Mo.

Gain: 8.
Base: 600.
Window: 200.

b. Step #2: Place assay pig beneath the thyroid probe at a distance 5 cm from the face of the collimator with the center of the assay pig aligned with the center of the collimator.

c. Step #3: Take 5 serial counts of 2 minutes each and average. Enter in assay log as 2 minutes background count.

d. Step #4: Place the collecting vial containing the total 99m-Tc eluate (at least 25 millicuries) in the assay pig. Position as for Step #2.

e. Step #5: Take 5 serial counts of 2 minutes each and average. Enter in assay log as 2 minutes 99-Mo counts.

f. Step #6: Remove collecting vial and replace with 137-Cs standard. Collect 5 serial counts and average. Enter in assay log as 2 minute standard counts.

g. Step #7 (Calculations):

$$\text{99-Mo Activity} = \frac{A \times B \times 6.3}{\frac{C}{D}}$$

2 Jul 81 This TP supersedes TP NM-1, subj as above, dtd 2 Dec 73.

Where:
A = net cp2m of 99m-Tc sample.
B = activity of 137-Cs sample in microcuries.
C = net cp2m of 137-Cs standard.
6.3 = conversion factor 137-Cs activity to equivalent 99-Mo activity.
D = number of millicuries of 99m-Tc in collecting vial.

If the assay reveals more than 1 microcurie of 99-Mo in 1 millicurie of 99m-Tc, or more than 5 microcuries of 99-Mo per dose, the material will NOT be given to humans.

h. Step #8 (99m-Tc Assay): The assay for 99m-Tc will be done in the mediac dose calibrator set for 99m-Tc. Total activity will be noted and entered with volume in the Radiopharmaceutical RP Log.

Robert J. Corcoran.

ROBERT J. CORCORAN
MAJOR, MC
Chief, Nuclear Medicine Service

NUCLEAR MEDICINE SERVICE
DEPARTMENT OF RADIOLOGY
WALTER REED ARMY MEDICAL CENTER

*Technical Procedure
Number NM-2

3 January 1978

RADIOPHARMACEUTICAL TESTING AND QUALITY CONTROL

1. PURPOSE: To establish general procedures for the routine testing of radiopharmaceuticals at Walter Reed Army Medical Center.

2. Radiopharmaceuticals manufactured or compounded for human use will be prepared under the supervision of the Chief, Nuclear Medicine Service. Control numbers will be assigned to each batch produced and quality control records and appropriate control samples will be maintained.

3. Stock solutions used in compounding radiopharmaceuticals are prepared in the I.V. Section of the hospital pharmacy using pyrogen tested chemicals, sterilized by membrane filtration, gas or autoclaving and tested for pyrogenicity and sterility by U.S.P. methods. Stocks are identified by lot numbers and are shown by lot, when used for compounding in the radiopharmacy log book.

4. Testing for assay, identity, quality and purity will be accomplished prior to patient administration. When possible, sterility and pyrogenicity testing of parenterally administered products will be accomplished prior to administration to humans. If prior testing for sterility and pyrogenicity is not possible because of short half-life, testing will be accomplished after administration. Upon presentation of a statement signed by the administering physician attesting that a medical emergency exists, with the concurrence of the Chief, Nuclear Medicine Service, a radiopharmaceutical normally tested for sterility and pyrogenicity may be administered prior to such testing.

5. Not less than six trial batches of new radiopharmaceutical products or new methods of production will be completely tested prior to administration to humans.

6. Radiopharmaceuticals for oral administration will be routinely or periodically tested for sterility and pyrogenicity when deemed appropriate by Chief, Nuclear Medicine Service.

7. The United States Pharmacopoeia (USP) prescribed method of sterility and pyrogenicity testing will be used.

8. Testing for assay, identity, quality and purity of a radiopharmaceutical when not prescribed by the USP will be in keeping with best practices. This may include, but is not limited to pH, clarity, odor, volume, specific activity, chemical analysis, pharmacological effectiveness, liquid scintillation counting, gamma spectroscopy, 4 pi beta counting, dose calibration by free air ionization chamber technique, and total dose integration.

*This Technical Procedure supersedes TP Number NM-2, subject as above, dtd 30 May 1974.

9. Products containing radioisotope labelled ("tagged") compounds will be tested by radiochromatography to determine the location of the radioisotope and percent bonding.

10. Test producers for individual radiopharmaceuticals will be included in the protocols submitted to the WRAMC Radioisotope Committee for approval.

11. The following radiopharmaceuticals are compounded in the Radiopharmacy Section of the Nuclear Medicine Service, WRAMC:

a. Technetium-99m Sulfur Colloid.

b. Technetium-99m Macroaggregated Albumin.

c. Technetium-99m Human Serum Albumin.

d. Technetium-99m Diethylenetriaminepentaacetic Acid.

e. Technetium-99m Polyphosphate.

ROBERT J. CORCORAN
MAJOR, MC
Chief, Nuclear Medicine Service

NUCLEAR MEDICINE SERVICE
DEPARTMENT OF RADIOLOGY
WALTER REED ARMY MEDICAL CENTER

Technical Procedure
Number NM-4

3 January 1978

TECHNICAL PROCEDURE FOR DOSE CALIBRATION

1 PURPOSE: This technical procedure describes the methodology for preparing and calculating the dosage for radiopharmaceuticals.

2. MATERIAL HANDLING: All vials containing radioactive materials used in the manufacturing of radiopharmaceuticals will be placed in lead pigs.

3. PERSONNEL HANDLING: Personnel handling radioactive materials will wear disposable plastic gloves, wrist film badge and a whole body film badge.

4. CALCULATING ACTIVITY: The procedure for calculating the eluted fraction of 99m-Technitium is described in Technical Procedure NM-1. The 99m-Technitium used in compounding radiopharmaceuticals will be first measured in the Mediac Dose Calibrator set at 99m-Tc X 10. Immediately following compounding the finished product will again be assayed in the dose calibrator. The radiopharmacist will then calculate the specific activity and note in the RP log the activity per milliliter and the time of assay.

5. INDIVIDUAL DOSES: The technologist preparing individual doses will first note the radiopharmaceutical to be used and the activity prescribed on the patient prescription card. He will then use the dosage record portion of the prescription card to arithmetically calculate the amount required in milliliters. After drawing up the desired amount, he will place the syringe in the Mediac Dose Calibrator set at the required setting. The reading should be within plus or minus 2% of the calculated dose.

6. QUALITY CONTROL: The Mediac Dose Calibrator will be calibrated daily using the 226-Radium Source on the 226-Ra setting. The net reading, gross minus background, should be 16 $\pm$ 10%. If the value for this source is outside the 10% range, a serviceman should be notified to recalibrate the instrument.

Robert J. Corcoran

ROBERT J. CORCORAN
MAJOR, MC
Chief, Nuclear Medicine Service

This Technical Procedure supersedes TP NM-4, subject as above, dtd 31 May 1974.

Incl 15

93828

NUCLEAR MEDICINE SERVICE
DEPARTMENT OF RADIOLOGY
WALTER REED ARMY MEDICAL CENTER

Technical Procedure
Number-NM3

3 JANUARY 1978

1. PURPOSE: The purpose of this technical procedure is to show the placement of shielding within the hot lab to provide adequate radiation protection.

2. INVENTORY AND STORAGE MODULE: This module consists of twelve drawers for storage of individual radiopharmaceuticals. Each drawer is lead lined with ½ inch lead in front and ¼ inch in the sides and bottom and ½ inch on top. A plastic insert is in each drawer for ease of cleaning and decontamination, if needed. Each drawer is labelled with the name of the appropriate radiopharmaceutical.

3. GENERATOR AND STORAGE MODULE: This module consists of four lead lined compartments. The lining is 3/4 inch thick in front and ¼ inch on the sides and bottoms. The tops are ½ inch thick. The upper left hand drawer is for generator storage with the generator for emergency use, immediately placed under the sliding top entry port for easy access. The remaining drawers may be used for storage of decaying outdated generators.

4. WASTE DISPOSAL AND STORING MODULE: There are two of these modules and they are intended strictly for use as waste disposal areas. All injectable materials, i.e. syringes, needles, liquids, etc, used in the preparation and administration of radioactive materials will be placed in the ports located on top of the modules. Each day, the upper most drawer will be replaced by a new drawer and the old drawer placed in it's position. All drawers will be emptied weekly and placed in a container marked "radioactive waste" and held in the left side of the module pending pick-up by Health Physics personnel.

5. DOSE PREPARATION AREA: This area consists of ¼ inch lead shields mounted in tracks with mirrors for observing dose preparations. This arrangement will reduce radiation to the user's eyes and body.

6. IODINATION HOOD: This hood located within the #1 fume hood is to be used for handling of all open iodinated products. The hood consists of carbon absorbers to remove oxidized iodine from the work area.

7. QUALITY CONTROL: To ensure adequate radiation protection, readings from a model E-120 geiger counter should not exceed 1 mr/hr at the face of the shielding in all areas.

8. MONITORING: WRAMC Health Physics personnel will make periodic checks to ensure compliance with appropriate regulations.

Robert J. Corcoran

ROBERT J. CORCORAN
MAJ MC
CHIEF, NUCLEAR MEDICINE SVC.

Encl 14 This TP supersedes TP NM-3, subj as above, dtd 30 May 74.

NUCLEAR MEDICINE SERVICE
DEPARTMENT OF RADIOLOGY
WALTER REED ARMY MEDICAL CENTER

Technical Procedure
Number NM-4

3 January 1978

TECHNICAL PROCEDURE FOR DOSE CALIBRATION

1 PURPOSE: This technical procedure describes the methodology for preparing and calculating the dosage for radiopharmaceuticals.

2. MATERIAL HANDLING: All vials containing radioactive materials used in the manufacturing of radiopharmaceuticals will be placed in lead pigs.

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6. QUALITY CONTROL: The Mediac Dose Calibrator will be calibrated daily using the 226-Radium Source on the 226-Ra setting. The net reading, gross minus background, should be 16 $\pm$ 10%. If the value for this source is outside the 10% range, a serviceman should be notified to recalibrate the instrument.

Robert J. Corcoran

ROBERT J. CORCORAN
MAJOR, MC
Chief, Nuclear Medicine Service

This Technical Procedure supersedes TP NM-4, subject as above, dtd 31 May 1974.

Incl 15

93828

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

NOV 8 1978

MEMORANDUM FOR FILE: Walter Reed Army Medical Center
Docket No. 30-1317
License No. 08-01738-02

FROM: Edwin D. Flack, Division of FFMSI, IE

SUBJECT: INQUIRY FROM A PRIVATE CITIZEN REGARDING RADIATION FROM WALTER REED ANNEX IN FOREST GLEN, MARYLAND

As stated in the enclosed memorandum from G. Kerr to L. Higginbotham dated October 2, 1978 the Office of State Programs received a call from a Mr. a private citizen, on September 26, 1978 expressing concern over possible radiation from Walter Reed Annex in Forest Glen, Maryland. Mr. main concern was in regard to a building that could be seen from his present business location. L. Bolling of the Office of State Programs contacted E. Flack of IE. E. Flack and L. Higginbotham, then talked with Mr. regarding his concerns and promised him that IE would look into his concerns and call him back within the next couple of days. Mr. concerns are stated in the attached October 2, 1978 memorandum.

On September 29, 1978 E. Flack and L. Higginbotham visited Walter Reed Annex and talked with Colonel Quillen, the officer in charge of health physics at Walter Reed. It was determined that the building of concern was a building which housed a dismantled research reactor which had been shut down for a couple of years. Colonel Quillen and his staff stated that environmental sampling and radiation surveys were still being done routinely in and around the building and that no unusual incidence had occurred recently or in the past.

After meeting with Colonel Quillen and his staff, E. Flack and L. Higginbotham visited Mr. in order to discuss and answer his questions. It was determined during this visit that Mr. main concerns regarding the radiation from Walter Reed were related to his planned purchase of the property immediately in back of the dismantled research reactor building. Mr. stated that if he bought this property, he planned to build a new building for his office supply business. Mr. was told that NRC routinely inspected Walter Reed; that a routine inspection would be done within the next couple of months; and that the results of that inspection would be sent to him.

CONTACT: E. D. Flack
49-28188

Ex. 6

Information in this record was deleted
in accordance with the Freedom of Information
Act, exemptions 6
FOIA 2006-0238

nn/10

Mr. appeared to be satisfied with IE's action. Region I (J.Kinneman) was contacted and asked to send Mr. a copy of the next inspection correspondence.

Edwin D. Flack
Division of Fuel Facilities and
Materials Safety Inspection
Office of Inspection and Enforcement

cc: W. Kerr, SP
J. Kinneman, RI
L. Higginbotham

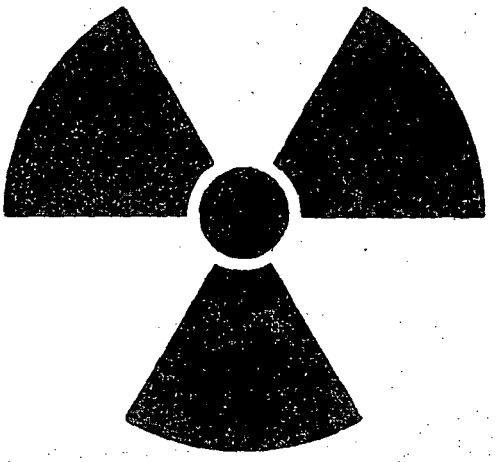
Ex. 6

SUPPLEMENT D

RADIATION PROTECTION PROGRAM

WRAMC Regulation 40-10
Health Physics Regulations

HEALTH PHYSICS REGULATIONS



WALTER REED ARMY MEDICAL CENTER
WASHINGTON D.C., 20012

Posted

WR 40-10
C1

DEPARTMENT OF THE ARMY
HEADQUARTERS WALTER REED ARMY MEDICAL CENTER
Washington, D.C. 20012

WRAMC Regulation
No. 40-10
Change 1

17 June 1974

Medical Service

HEALTH PHYSICS REGULATIONS

WR 40-10, 15 June 1973, is changed as follows:

1. Page 3, para G, change to read as follows: Personnel Reliability Program.

2. Page 4, para L, change to read as follows: Accountability and Inventory of Radioactive Material and Machines Which Produce Ionizing Radiation.

3. Page A-1, para 3a, line 5, change to read as follows: nuclear material and source material.

4. Page B-5, para 27, change word "occupant" to read: user.

5. Page D-1, para 3, change to read: Definitions and Requirements for Controlled Areas.

6. Page D-1, para 3a(2), delete paragraph.

7. Page D-2, para 3c(2)(b), change to read: in accordance with 10CFR20.203 and 29CFR1910.96.

8. Page D-3, para 3d(1), delete: from para 3-1e, AR 385-30.

9. Page D-3, para 3e(1), delete: used for histological staining.

10. Page D-3, para 3e(3), delete last sentence of paragraph.

11. Page E-1, para 2c, delete paragraph.

12. Page E-2, para 3e, change word "Biodosimetric" to read: Bioassay.

13. Page E-2, para 3e(3), change to read: Breath analysis.

14. Page E-2, para 3e, add paragraph: (5) Fecal analysis.

15. Page E-2, para 4a, change word "Restricted" to read: Controlled.

16. Page E-2, para 4e, delete words: or replace.

17. Page I-3, para 5e, add paragraph: (3) Radioisotope Users Course.

18. Page I-3, para 5h, change word "Radioisotope" to read: Nuclear Medicine.

19. Page K-1, para 2c, change last sentence to read: USAEC Licenses are issued for byproduct material, source material and special nuclear material.

20. Page L-1, change subject to read: ANNEX L (ACCOUNTABILITY AND INVENTORY OF RADIOACTIVE MATERIAL AND MACHINES WHICH PRODUCE IONIZING RADIATION).

21. Page L-1, para 1a, delete the words: lasers and microwave equipment.

22. Page L-1, para 2d, delete the words: lasers and microwave equipment.

23. Page L-2, para 3a, delete the words: laser, microwave, or.

24. Page L-2, para 3b, change "DA Form 8-235 (Pharmacy, Drug and Narcotic Stock Record)" to read: DA Form 3862 (Controlled Substances Stock Record).

25. Page M-2, para 3b(5), delete paragraph and substitute: Will display DA Label 135 on dashboard.

26. Page M-4, para 4, add following paragraphs: (g) AR 700-52, (h) 49 CFR, and (i) 10 CFR.

27. Page N-2, para 3c(8), change the words "picked up by" to read: delivered to.

28. Page P-1, para 2a, delete the words: and will provide a written report of the survey to the Principal User.

29. Page R-1, para 2e, change the words "30 mCi" to read: 8 mCi.

30. Page R-11, para 2a, change the word "estimated" to read: evaluated.

31. Page R-15, para 6b(2), delete the words: of 5 mR/hr.

32. Page R-15, para 6c(2), change the words " is 2 mR/hr or less" to read: indicates a "no restriction" level of activity.

33. Page R-16, para 7a(1), change the words "30 millicuries" to read: 8 millicuries.

34. Page X-1, para 2b(4), add the following sentence: Contact Health Physics immediately if any shipment appears to have been damaged.

35. Remove old pages and insert new pages as indicated below:

REMOVE PAGES (15 June 1973)	INSERT PAGES (17 June 1974)
C-1, C-2, C-3	C-1, C-2, C-3
D-5, D-6	D-5, D-6, D-7, D-8
E-3, E-4	E-3, E-4
F-1, F-2, F-3, F-4, F-5, F-6	F-1, F-2, F-3, F-4, F-5
G-1, G-2, G-3, G-4	G-1, G-2
J-1, J-2	J-1, J-2
K-5, K-6	K-5, K-6
Q-1, Q-2, Q-3, Q-4, Q-5, Q-6, Q-7, Q-8	Q-1, Q-2, Q-3, Q-4, Q-5
R-13, R-14	R-13, R-14
U-3	U-3
W-1, W-2, W-3, W-4, W-5, W-6, W-7, W-8	W-1, W-2, W-3, W-4, W-5, W-6, W-7, W-8

36. File this change in front of the publication for reference purposes.

FOR THE COMMANDER:

FRED C. BRAND
LTC, MSC
Adjutant

DISTRIBUTION: 200 copies
Special (HPO)

DEPARTMENT OF THE ARMY
HEADQUARTERS WALTER REED ARMY MEDICAL CENTER
Washington, D.C. 20012

WRAMC Regulation
No. 40-10

15 June 1973

Medical Service

HEALTH PHYSICS REGULATIONS

	Paragraph
Purpose	1
Scope	2
Implementation	3
Organization Of These Regulations	4
Definitions	5
Annexes (See pages 3 - 5)	

1. PURPOSE. These Regulations:

a. Implement the applicable laws, regulations, conditions and restrictions under which radioactive materials and X-ray, microwave, or laser radiation-producing devices are used.

b. Promulgate the rules, direction, and guidance of the WRAMC Radioisotope Committee in the proper and safe handling of radioactive material and equipment which produces X-ray, microwave, or laser radiation.

c. Control the production, procurement, receipt, storage, use, repair, transfer and disposal of radioactive material and equipment which produce X-ray, laser, or microwave radiation.

d. Prescribe the radiation protection program for Walter Reed Army Medical Center.

2. SCOPE. These Regulations apply to all activities and organizations using radioactive material and/or equipment which produce X-ray, laser, or microwave radiation at Walter Reed Army Medical Center, 6825 16th Street, N.W., Washington, D.C. 20012; Forest Glen Annex, Walter Reed Army Medical Center, Montgomery County, Maryland; medical units of the Departmental Medical Activities, WRAMC (DMEDA); and USAMRIID, Fort Detrick, Maryland.

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* This Regulation supersedes WR 40-10 (30 July 1969) with changes 1 & 2, HR 40-40 (8 Mar 66) and HR 40-53 (29 Jul 65).

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3. IMPLEMENTATION. The Health Physics Officer, WRAMC, is the principal staff officer responsible for the implementation of these Regulations. Temporary minor exceptions to specific provisions of these Regulations may be granted on an individual basis by the Health Physics Officer providing such exceptions do not jeopardize radiological safety or violate law, regulation, the conditions of USAEC Licenses or the provisions of DA Authorizations to use radioactive materials.

4. ORGANIZATION OF THESE REGULATIONS. To facilitate the use and understanding of these Regulations, the contents have been divided into separate annexes, each dealing with a specific topic. Therefore, it is necessary to consult only the annex dealing with the specific matter in question to find the pertinent information.

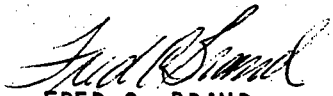
5. DEFINITIONS. As used in these Regulations, the following definitions apply:

a. Shall, Will infer a standard, condition, or procedure which must be met if one is to be in compliance with this and other Regulations.

b. May, Should, Is Recommended infer a standard, condition, or procedure from which one may deviate for good and sufficient reason without violating this or other Regulations. Decisions to deviate from the accepted procedures in these Regulations warrant the careful consideration of the Principal User or other responsible individuals in a supervisory capacity.

6. The proponent agency of this Regulation is the Office of the Commander (MEDEC-YHP). Users are invited to send comments and suggested improvements on DA Form 2028 (Recommended Changes to Publications) to CDR, WRAMC, ATTN: MEDEC-A, Washington, D.C. 20012.

FOR THE COMMANDER:



FRED C. BRAND
LTC, MSC
Adjutant

DISTRIBUTION: 200 copies
Special (HPO)

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to WR 40-10 (Health Physics Regulations)

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ANNEX A (AUTHORIZATION TO USE RADIOACTIVE MATERIAL)
to WR 40-10 (Health Physics Regulations)

1. PURPOSE. The purpose of this ANNEX is to describe the administrative policies and procedures relating to the use of radioactive material.

2. GENERAL. Walter Reed Army Medical Center has been issued various USAEC Licenses and DA Authorizations to permit the receipt, possession, storage, use, transfer, and disposal of radioactive material within the installation. No individual may be licensed by the AEC to use radioisotopes at WRAMC. Accordingly, the possession and use of radioactive materials by individuals at WRAMC is permitted only when specifically authorized by the WRAMC Radioisotope Committee.

3. DEFINITIONS.

a. US Atomic Energy Commission License. A license issued to WRAMC which permits the receipt, possession, storage, utilization, transfer, and disposal of certain radioactive material at WRAMC subject to specific conditions. USAEC Licenses are issued for byproduct material, special nuclear material ~~etc~~ SOURCE MATERIAL C-1

b. Department of the Army Authorizations. An authorization issued by Department of the Army to WRAMC which permits the receipt, possession, storage, utilization, transfer, and disposal of naturally-occurring and accelerator-produced radioactive material at WRAMC.

c. WRAMC Radioisotope Authorization. An authorization issued by the WRAMC Radioisotope Committee to an individual within the authority of the USAEC License and DA Authorization held by WRAMC to receive, possess, store, use, transfer, and dispose of radioactive material. WRAMC Radioisotope Authorizations are subject to the conditions of the USAEC Licenses, the Code of Federal Regulations, Department of Army Regulations, and these WRAMC Health Physics Regulations.

d. Human Use of radioactive materials refers to the diagnostic or therapeutic application of radioactive material to a human being.

e. Non-human Use of radioactive materials refers to those applications in which radioactive material is not applied or injected into human beings. In-vitro studies of human tissues are included in this category providing none of the product material is to be administered to humans.

f. Principal User is an individual who, by virtue of his training and experience with radioactive material, has been authorized by the

WRAMC Radioisotope Committee to possess and use radioactive material for a given purpose. A Principal User bears the responsibility for the safe handling of the material and for proper precautionary measures to protect himself and others from unwarranted exposure to radiation. He may dictate such rules, procedures, or other restrictions as he deems necessary to effect the proper handling of the radioactive material. He is directly responsible to the WRAMC Radioisotope Committee.

g. Co-worker is an individual who possesses adequate training and experience with comparable radioactive material or equipment to qualify him as a Principal User. A Co-worker performs such duties under the Authorization of the Principal User as directed. A Co-worker is responsible to the Principal User for safe and proper handling of radioactive materials.

h. Trainee is an individual who does not possess adequate training and experience to be authorized as a Principal User himself. He is assigned to this category so that he may obtain the necessary experience under the direct supervision of the Principal User and Co-workers. It is the aim of the Trainee to obtain suitable training and experience to become qualified as a Principal User or Co-worker.

i. Technician is an individual who, under the supervision of the Principal User and/or Co-worker, performs certain routine duties involving the use of radioactive material. He does not possess suitable training and experience to be classified as a Principal User or Co-worker, and is not undergoing such training as would qualify him to attain that status. Technicians must be trained in the safe handling of radioactive material, contamination control, and precautionary measures which may be taken to protect themselves and others from unwarranted exposure to radiation.

j. Health Physics is a profession devoted to the protection of man and his environment from unwarranted radiation exposure.

4. PROCEDURES FOR INITIALLY OBTAINING WRAMC RADIOISOTOPE COMMITTEE AUTHORIZATION TO USE RADIOACTIVE MATERIAL.

a. The Principal User prepares in final form the following documents (The appropriate forms and assistance in their preparation will be furnished by Health Physics upon request):

(1) Non-human Use

(a) WRAMC FL 0962, Request for Authorization to Use Radioactive Material - Non-human Use (one (1) copy; see APPENDIX 1 to this ANNEX).

(b) WRAMC FL 0963, Training and Experience of Users of Radioisotopes

(one (1) copy for each individual listed on WRAMC FL 0962; see APPENDIX 2 to this ANNEX).

(2) Human Use

(a) WRAMC FL 0964, Request for Authorization to Use Radioactive Material - Human Use (one (1) copy; see APPENDIX 3 to this ANNEX).

(b) WRAMC FL 0963, Training and Experience of Users of Radioisotopes (one (1) copy for each individual listed on WRAMC FL 0964; see APPENDIX 2 to this ANNEX).

(c) WRAMC FL 0965, Training and Experience of Human Users of Radioisotopes (one (1) copy for each physician listed on WRAMC FL 0964; see APPENDIX 4 to this ANNEX).

(d) If the contemplated use is not listed in the Appendix to AR 40-37, or if the contemplated dosage range exceeds the range shown in that Appendix, the Principal User must submit a protocol for Non-routine Medical Use of Radioactive Material. This protocol is an adaptation of Appendix F, AEC Licensing Guide - Medical Programs. Detailed information will be provided from Health Physics upon request (see APPENDIX 5 to this ANNEX). Patient dose calculations and literature reprints should accompany the protocol.

(e) If the contemplated use involves the use of human volunteers, the provisions of AR 70-25, "Use of Volunteers as Subject of Research", apply. It is the responsibility of the Principal User to obtain the required approval, through Command channels, from the Secretary of the Army. A copy of this approval will be forwarded with the request.

b. The Principal User obtains administrative approval from the individual occupying the next higher command position, i.e., Division Chief's Authorization will be approved by the Director, etc. The documents are then forwarded to the following:

(1) Non-human Use Authorization request:

Health Physics
Room 3, WRAIR

(2) Human Use Authorization request:

NCOIC, Health Physics
Radiation Therapy, WRAMC

c. The responsible Health Physics Technician will conduct an

initial survey of the contemplated laboratory facility to evaluate potential occupational hazards. A report of his findings and recommendations will be made to the Health Physics Officer.

d. The documentation forwarded to Health Physics will be referred to a member of the appropriate Subcommittee of the Radioisotope Committee. The procedure and qualifications of the workers will be evaluated to insure adequate training and experience in the safe handling of radioisotopes. In the case of Human Uses involving non-routine medical uses of radioisotopes, the protocol will be evaluated from a professional standpoint to determine the medical acceptibility of the procedure.

e. After approval by the Subcommittee Member, the documentation is forwarded to the Chief, Radioactive Material Control Section, Health Physics. He will verify the presence of all documents, attach additional documents as needed, and insure that procedure, radioisotope and activity requested may be allowed within the limitations of USAEC Licenses and DA Authorizations issued to WRAMC. The file is then forwarded to the Health Physics Officer.

f. The Health Physics Officer reviews the request for adherence to safe practices and for full compliance with all requirements. If conditions are required to insure the above, they will be developed with the concurrence of the other Subcommittee Member who approved the request.

g. Following approval, the Authorization will be recorded, a number assigned, and distribution effected.

h. The actions of the Subcommittees are reviewed at the regular meetings of the WRAMC Radioisotope Committee.

5. AMENDMENT OF WRAMC RADIOISOTOPE AUTHORIZATIONS TO USE RADIOACTIVE MATERIAL. If at any time the applicant desires to deviate from the procedure, the radioisotope, or the specified investigation as described on the approved Authorization, he shall request an amendment to his Authorization by submitting a Disposition Form (DA Form 2496) describing the proposed changes to his WRAMC Radioisotope Authorization through the Health Physics Officer to the WRAMC Radioisotope Committee. Routing amendments through the appropriate Health Physics Survey Section (para 4b, above) expedites processing. Amendments will be formally reviewed by the appropriate Subcommittee at the discretion of the Health Physics Officer.

6. REVIEW AND RENEWAL OF AUTHORIZATIONS. Current Authorizations will be reviewed at least annually and at other times as deemed appropriate by the Health Physics Officer. After review, Authorizations are renewed, discontinued, or revised in accordance with current requirements.

7. APPENDICES:

a. WRAMC FL 0962(OT), Request for Authorization to Use Radioactive Material - Non-Human Use.

b. WRAMC FL 0963(OT), Training and Experience of Users of Radioisotopes.

c. WRAMC FL 0964(OT), Request for Authorization to Use Radioactive Material - Human Use.

d. WRAMC FL 0965(OT), Training and Experience of Human Users.

e. Non-routine Medical Uses of Radioactive Material.

REQUEST FOR AUTHORIZATION TO USE RADIOACTIVE MATERIAL NON-HUMAN USE *(WRAMC Regulation 40-10)*

Use supplemental sheets where necessary. Use accepted chemical symbols and abbreviations wherever possible.

THRU: Health Physics Officer
Health Physics Survey Section
Room #3, WRAIR

TO: Radioisotope Committee, WRAMC

FROM:

(Principal User & Organization)

DATE

PHONE

List all CO-WORKERS *w/grade & org. Attach comp WRAMC 421 a&b if not on file w/ WRAMC HPO.*	*List all* TRAINEES *w/grade & org. Attach compl WRAMC 421 a&b if not on file w/ WRAMC HPO.*	*List all* TECHNICIANS *who will work w/ Rada Mtl under this Authorization.*

RADIOACTIVE MATERIAL WILL BE USED IN

RADIOACTIVE MATERIAL WILL BE STORED IN

☐ UNSEALED SOURCE

☐ SEALED SOURCE

DESCRIPTION OF USE

RADIOISOTOPE	CHEMICAL AND/OR PHYSICAL FORM	POSSESSION LIMIT	USE

I acknowledge my responsibilities as PRINCIPAL USER *as defined in WRAMC Regulation 40-10:*

(Signature of Principal User)

ADMINISTRATIVE APPROVAL:

(Signature of C of Svc, Dept, or Div)

WRAMC RADIOISOTOPE COMMITTEE APPROVAL

APPROVED:	APPROVED:	AUTHORIZATION NO.
HEALTH PHYSICS OFFICER WRAMC	MEMBER, SUBCOMMITTEE FOR NON-HUMAN USE, RADIOISOTOPE COMMITTEE, WRAMC	REVIEW DATE

WRAMC FORM 0962(OT) 1 NOV 68

TRAINING AND EXPERIENCE OF USERS OF RADIOISOTOPES

DATE

NAME, RANK, BRANCH, SERVICE NUMBER, SOCIAL SECURITY ACCOUNT NUMBER

PHONE

1. FORMAL EDUCATION: Total Number of Years of Formal Schooling _____

	Higher Educational Institutions Attended	Type of Program Pursued and Dates of Attendance	Degree, Diploma or Certificate Received and Date
a.			
b.			
c.			
d.			

2. TRAINING IN THE USE OF RADIATION PRODUCING SOURCES AND DEVICES

I have received the following training in the subjects listed below:

HOURS	Formal/On-the-Job Training	Subject Area	Identify where trained by Institution Letter from above and Indicate any additional
_____	of _____	in PRINCIPLES & PRACTICES OF RADIATION PROTECTION	
_____	of _____	in RADIOACTIVITY MEASUREMENT	
_____	of _____	in STANDARDIZATION	
_____	of _____	in MONITORING TECHNIQUES	
_____	of _____	in INSTRUMENTATION	
_____	of _____	in MATHEMATICS & CALCULATIONS BASIC TO THE USE & MEASUREMENT OF RADIOACTIVITY	
_____	of _____	in BIOLOGICAL EFFECTS OF RADIATION	

(Use additional sheets or reverse of this form to describe any other training received in the use of radiation producing sources and devices.)

3. EXPERIENCE IN THE USE OF RADIATION PRODUCING SOURCES AND DEVICES. *(Show Actual Use of Radioisotopes or Equivalent Experience.)*

ISOTOPE	MAXIMUM AMOUNT	WHERE EXPERIENCE WAS GAINED	DURATION OF EXPERIENCE	TYPE OF USE

REQUEST FOR AUTHORIZATION TO USE RADIOACTIVE MATERIAL HUMAN USE *(WRAMC Regulation 40-10)*

Use supplemental sheets where necessary. Use accepted chemical symbols and abbreviations wherever possible.

THRU: Health Physics Officer
Health Physics Survey Section
Room #3, WRAIR

TO: Radioisotope Committee, WRAMC

FROM: *(Principal User & Organization)*

DATE

PHONE

List all CO-WORKERS *w/grade & org. Attach compl WRAMC 421a&b if not on file w/ WRAMC HPO.*	*List all* TRAINEES *w/grade & org. Attach compl WRAMC 421 a&b if not on file w/ WRAMC HPO.*	*List all* TECHNICIANS *who will work w/. Rada Mtl under this Authorization.*

RADIOACTIVE MATERIAL WILL BE USED IN ☐ UNSEALED SOURCE

RADIOACTIVE MATERIAL WILL BE STORED IN ☐ SEALED SOURCE

BYPRODUCT MATERIAL	CHEMICAL AND/OR PHYSICAL FORM	POSSESSION LIMIT	USE	DOSAGE RANGE

CHECK ONE BLOCK IN EACH SECTION

1 ☐ I HAVE COMPLIED WITH THE PROVISIONS OF AR 40-7 *(Clinical Use of Investigational Drugs)* AND ALL OTHER APPLICABLE ADMINISTRATIVE REQUIREMENTS.
☐ AR 40-7 DOES NOT APPLY.

2 ☐ I HAVE COMPLIED WITH THE PROVISIONS OF AR 70-25 *(Use of Volunteers as Subjects of Research)*, AND REPORTING REQUIREMENTS OF AR 40-37 *(Radioisotope License Program (HUMAN USE))*.
☐ HUMAN VOLUNTEERS WILL NOT BE USED UNDER THIS AUTHORIZATION.

I acknowledge my responsibilities as PRINCIPAL USER *as defined in WRAMC Regulation 40-10:*

(Signature of Principal User)

ADMINISTRATIVE APPROVAL:

(Signature of C of Svc, Dept, or Div)

WRAMC RADIOISOTOPE COMMITTEE APPROVAL

APPROVED:	APPROVED:	AUTHORIZATION NO.
HEALTH PHYSICS OFFICER WRAMC	MEMBER, SUBCOMMITTEE FOR HUMAN USE RADIOISOTOPE COMMITTEE, WRAMC	REVIEW DATE

WRAMC FORM 0964(OT) 1 NOV 68

TRAINING AND EXPERIENCE OF PHYSICIAN
(CR 40-10)

DATE

USING PHYSICIAN'S NAME, RANK, SERVICE NUMBER, SSAN

PHONE

2. CLINICAL TRAINING AND EXPERIENCE OF PHYSICIAN NAMED IN ITEM 1 ABOVE

(A) ISOTOPE	(B) CONDITIONS DIAGNOSED OR TREATED	(C) NO. CASES OBSERVED	(D) NO. CASES INVOLVING PERSONAL PARTICIPATION
I-131 and/or I-125	Diagnosis of thyroid function		
	Dilution studies		
	Excretion studies		
	Brain tumor localization		
	Scanning studies		
I-131	Treatment of hyperthyroidism		
	Treatment of cardiac conditions		
	Treatment of thyroid carcinoma		
P-32 Soluble	Treatment of polycythemia		
	Treatment of leukemia		
	Treatment of bone metastases		
	Tumor localization		
	Intracavitary treatment		
	Interstitial treatment		
Au-198	Intracavitary treatment		
	Interstitial treatment		
	Scanning studies		
Cr-51	Blood determinations		
	Scanning studies		
Co-58 or Co-60	Diagnosis of pernicious anemia		
Co-60 Ir-192	Interstitial treatment		
	Intracavitary treatment		
Co-60 or Cs-137	Teletherapy treatment		
Sr-90	Treatment of superficial diseases of the eye		
Other Isotopes			

3. CLINICAL RADIOISOTOPE TRAINING AND EXPERIENCE

DATES	HOURS	NAME & ADDRESS OF INSTITUTION	SUPERVISING PHYSICIAN

(SIGNATURE)

APPENDIX 5 (NON-ROUTINE MEDICAL USES OF RADIOACTIVE MATERIAL)
to ANNEX A (AUTHORIZATION TO USE RADIOACTIVE MATERIAL)

1. Experimental and non-routine medical uses of byproduct materials include all human uses not specified in the Appendix to AR 40-37. Such uses may be classified into one of two phases of development:

a. Clinical Research applies to a new use of radioactive material in humans. Little or nothing is known about the procedure and little or nothing has been published on the subject. The basis for proceeding with the new use in humans is derived from knowledge obtained from animal studies. This phase of development includes the initial introduction into humans and initial trials on a limited number of patients.

b. Clinical Evaluation applies to the planned testing of a new diagnostic or therapeutic procedure in an appropriate series of control and diseased humans. The procedure and results of clinical research will ordinarily have been reported in the literature or at meetings. If adequate information has not been published, the applicant should have spent sufficient time with those who developed the test to be thoroughly familiar with the details.

2. The clinical research phase of experimental or non-routine medical use of radioactive material is normally limited to physicians who have broad experience in the use of radioisotopes and who have appropriate facilities and equipment available to conduct research. The individual physician to be designated as the authorized user should normally have broad and varied experience in the use of radioisotopes and in clinical research investigation.

3. The clinical evaluation phase of experimental or non-routine medical use of radioactive material is normally limited to physicians under the supervision of an individual physician with broad experience in clinical evaluation and the use of radioisotopes and under the guidance of a radioisotope committee representing a number of disciplines. Adequate resources to conduct the trials shall be available.

4. Applications for experimental or non-routine uses of radioactive material in humans are reviewed by the WRAMC Radioisotope Committee. Applications should be supported by a research protocol which includes:

a. Title of study

b. The purpose for conducting the study. Indicate whether the study is to be clinical research or clinical evaluation and explain why.

c. The plan of investigation in sufficient detail to permit a critical

evaluation of the methods for conducting the experiments and the controls established.

d. A statement as to whether any planned complementary drug or radioisotope administration is contemplated in conjunction with the study.

e. A statement about the expected fate of the isotope administered and, if the procedure is for therapy, a statement about the expected effects.

f. If the application is for clinical research, an outline of related work conducted by the applicant or others in laboratory animals and in humans, including data on localization, effective half-life, and radiation dosage. If no work has been conducted in animals, explain why. Pertinent references and a brief abstract prepared by the applicant of published or unpublished material should be submitted (The brochure of a commercial supplier is not a satisfactory authority for this purpose).

g. If the application is for clinical evaluation, pertinent references and a brief abstract prepared by the applicant of published or unpublished material, including information on localization, effective half-life, and radiation dosage should be submitted (The brochure of a commercial supplier is not a satisfactory authority for this purpose).

h. If volunteers are to be used as human subjects of research, the provisions of AR 70-25 apply, and the applicant must include the written consent of the Secretary of the Army secured in accordance with that regulation.

i. If investigational drugs are to be used clinically in the project on human subjects, the provisions of AR 40-7 apply, and the applicant must include the written approval of the Army Investigational Drug Review Board obtained in accordance with that regulation. Investigational drugs are defined as: "A new drug, not yet approved by the Commissioner of Food and Drugs, Department of Health, Education, and Welfare for general use by the public as a safe and efficacious drug, and that is proposed for clinical study under Department of Army auspices after adequate preclinical information has been obtained".

j. A description of human subjects to be studied:

(1) Persons without manifest disease - number, method of selection, age range.

(2) Persons with manifest disease - number, nature of pathology, method of selection, age range.

(3) Pregnant women shall ordinarily be excluded from any test not involving the condition of the pregnancy itself. Specify whether or not pregnant women will be tested and if so, explain why.

ANNEX B (RESPONSIBILITIES OF PRINCIPAL USERS OF RADIOACTIVE MATERIAL) to WR 40-10 (Health Physics Regulations)

1. PURPOSE. The purpose of this ANNEX is to delineate the responsibilities and authority of a Principal User of radioactive material.

2. DEFINITIONS.

a. Principal User. See definition, para 3f, ANNEX A to these Regulations.

b. Co-worker. See definition, para 3g, ANNEX A to these Regulations.

c. Trainee. See definition, para 3h, ANNEX A to these Regulations.

d. Technician. See definition, para 3i, ANNEX A to these Regulations.

3. SPECIFIC RESPONSIBILITIES.

a. Become thoroughly familiar with the contents of these Regulations prior to the use of radiation sources.

b. Obtain and use radiation sources only as authorized by these Regulations.

c. Take adequate precautionary measures to protect himself and others from unwarranted exposure to radiation.

d. Seek advice and assistance from the Health Physics Officer when in doubt concerning the safety of an operation.

e. Prescribe rules, procedures, SOPs, or protocols for the use of radioactive materials under his control to insure their proper and safe use. These will be made available to any radiation worker in that area and will be furnished to Health Physics upon request (See the APPENDIX to this ANNEX for a list of radiation laboratory safety rules).

f. Insure that all personnel working under his Authorization or in his area of responsibility are familiar with the specific practices to be followed or avoided in the interest of radiological safety. Health Physics will assist in providing instruction in radiation safety upon request.

g. Preclude the misuse of radioisotopes and radiation-producing devices by unstable or irresponsible personnel who might endanger themselves or others by their conduct.

h. Insure that all rules, procedures, and practices of radiological safety are vigorously followed in the work area.

i. Seek the assistance of the appropriate supervisors if assistance in obtaining cooperation and compliance is needed. Although Health Physics is available to provide necessary technical advice on matters of radiological safety, enforcement of regulations and rules is basically the responsibility of the immediate supervisor. All disputes should be resolved at the lowest possible level.

j. The Principal User shall promptly report to the Health Physics Officer all known or suspected overexposures to radiation. The overexposed individual shall cooperate in any and all attempts to evaluate his radiation exposure.

k. Maintain a current inventory of the curiage of radioactive material on hand to be readily available to the Health Physics Officer upon request.

l. Provide information and assistance to Health Physics personnel which is necessary for the completion of adequate radiation protection surveys. If classified or sensitive information must be discussed, it must be clearly identified so that it will not become subject to compromise.

m. The Principal User is directly responsible to the WRAMC Radioisotope Committee for violations of these Regulations by personnel working under his Authorization. The Health Physics Officer will report all cases of this nature to the Committee whenever appropriate corrective actions are not initiated by the Principal User or when violations are repeated or flagrant. The Principal User will be invited to the meeting at which the matter is discussed.

n. Additional specific responsibilities are described in:

(1) ANNEX H, para 2
(2) ANNEX K, para 4b
(3) ANNEX L, para 1c
(4) ANNEX N, para 2b, 2c
(5) ANNEX P, para 2b
(6) ANNEX U, para 2b
(7) ANNEX W, para 3
(8) ANNEX X, APPENDIX 4

APPENDIX (RECOMMENDED RULES OF LABORATORY SAFETY FOR RADIATION WORKERS)
to ANNEX B (RESPONSIBILITIES OF PRINCIPAL USERS OF RADIOACTIVE MATERIAL)

1. No eating, drinking, smoking or applying cosmetics in any area where radioisotopes are stored or used.

2. Do not bring food or drink into areas where radioisotopes are used or stored, even if it is to be eaten elsewhere.

3. Do not store food (lunch bags, soft drinks, etc.) in cabinets, refrigerators, etc., which are used or have been used for radioactive material.

4. Do not use laboratory glassware or equipment for the preparation or consumption of food or drink.

5. Wear protective gloves, aprons, laboratory coats, etc., whenever there is a possibility of contaminating oneself.

6. Protect all breaks in the skin with waterproof material, e.g., rubber gloves, whenever handling radioactive materials.

7. Wash hands thoroughly, including under fingernails, with mild soap and water and a soft brush after handling any radioisotope and monitor hands with a suitable detector before going about any other work and whenever leaving the laboratory for meals, coffee-breaks, etc., and especially before eating, drinking, smoking or applying cosmetics.

8. Never wash hands with solvent materials; use mild soap and water and a soft brush if needed.

9. Eliminate all sharp objects, e.g., broken glassware, from areas where radioactive materials are used.

10. Wear film badges (dosimeters, if issued) at all times during duty hours, except for medical and dental appointments.

11. When leaving the work area for the day or for medical or dental appointment, leave the film badge (and dosimeter, if issued) in a controlled low background area where it will not be exposed. Do not take film badge home without permission from Health Physics.

12. Do not tamper with film badges or dosimeters. Protect them from damage.

13. Mark all radiologically contaminated, or potentially contaminated containers, and equipment clearly with radioactive marking tape.

14. At the conclusion of each run of the experiment using radioactive material; decontaminate areas, change absorbent paper, clean up equipment, etc., to avoid buildup of contamination.

15. Do not wear lab coats which were worn during the use of radioactive material for other work or outside the lab. Contamination on the coat may be spread, absorbed or ingested if care is not taken.

16. Never pipet by mouth, even water. Bad habits, once formed, are not easily broken.

17. Report all known or suspected exposures, contamination, spills, inhalations, ingestions, absorptions, or injections of radioactive materials IMMEDIATELY to Health Physics, Ext. 5107, and to your immediate supervisor. No punitive action will be taken against individuals who are accidentally exposed to radiation, for the accident or for prompt reporting.

18. Dispose of radioactive waste only in the receptacles provided. Do not mix radioactive and non-radioactive waste.

19. If a radioactive waste sink is available, follow the posted instructions for use. Be sure to complete the log book entry.

20. Keep work areas where radioactive materials are used free from unnecessary materials and equipment.

21. Where practical, use absorbent paper to limit the spread of contamination.

22. Use common sense.

23. Do not handle telephone, reports, etc., with contaminated hands or while using protective gloves.

24. Keep fingernails short and clean.

25. Personnel working with radioactive materials will report IMMEDIATELY any cuts or skin abrasions occurring during the working hours.

26. The following procedures are followed in the event of a wound incurred while working with radioactive materials:

a. Wash the injured area at once with running water. Time is important; even a few seconds may make a considerable difference.

b. Notify the appropriate superior and Health Physics (Ext. 5107).

c. Self-treatment or antiseptics shall not be employed until the wound has been checked by a Medical Officer.

C-1 27. To preclude the buildup of contamination, the laboratory will be surveyed by the ~~occupants~~ USER daily with the survey instrument provided.

ANNEX C (ROLE OF WRAMC HEALTH PHYSICS)
to WR 40-10 (Health Physics Regulations)

1. PURPOSE. To delineate the general responsibility of the Health Physics Officer pertaining to these Regulations.

2. RESPONSIBILITIES OF THE HEALTH PHYSICS OFFICER.

a. A more complete and detailed description of the organization, function and responsibilities of Health Physics may be found in the WRAMC Organizational and Functional Manual.

b. Advises the Commander, WRAMC on the control of radiation hazards.

c. Directs all Health Physics activities at WRAMC.

d. Serves as principal WRAMC Staff Officer for control of radioactive material and sources of radiation including X-ray, microwave, and laser.

e. Acts as executive agent for all USAEC Licenses and DA Authorizations for the possession, storage, and use of radioactive material at WRAMC.

f. Acts as the custodian of all radioactive materials at WRAMC.

g. Provides advice, assistance, and support of all activities using radioactive material or machine-produced radiation on matters of radiation safety.

h. Conducts and administers education and training programs in the use of radioactive material.

i. Furnishes technical support to activities with specific requirements which exceed their capabilities.

j. Performs missions which can be effectively consolidated to free individual users and enable them to more effectively utilize their resources toward the accomplishment of their primary objectives. Among these are the following:

(1) Performs radiation protection surveys.

(2) Administers the photodosimetry and bioassay programs.

(3) Radioactive Material Control including:

(a) Maintains inventory of radioactive material and machines which produce X-ray, laser, or microwave radiation at WRAMC.

(b) Insures compliance with possession limits, etc., of USAEC Licenses and DA Authorizations.

(c) Renders required administrative reports.

(d) Keeps necessary and required records to insure compliance with law and regulations.

(e) Monitors incoming shipments of radioactive material to avoid contamination of the user's facilities and to insure compliance with federal packaging, labeling, and shipping requirements.

(f) Receives, processes, and ships radioactive waste generated at WRAMC.

(g) Transports radioactive material throughout WRAMC.

(h) Ships radioactive material from WRAMC in compliance with Federal and Department of the Army Regulations.

(4) Services, repairs, and calibrates portable survey instruments used at WRAMC, tenant units, and USAMRIID.

(5) Provides full-range Health Physics support for all users of ionizing and nonionizing radiation sources and devices at WRAMC and USAMRIID.

(6) Maintains an around-the-clock emergency response capability to meet any contingency involving radiation, radioactive material, or personnel exposure.

(7) Supplies users with certain specialized Health Physics equipment needed for the control of radiological hazards.

(8) Administers the Personnel Reliability program for WRAMC.

(9) Develops and tailors radiation protection programs to meet the needs of individual users.

(10) Assists radiation workers in avoiding unwarranted exposure to radiation through close and continuous support.

(11) Conducts the environmental radiation surveillance program for WRAMC.

(12) Provides full-range Health Physics support for the DORF reactor.

3. ORGANIZATION. Health Physics is composed of an administrative section and two operational branches.

a. The Reactor and Survey Branch has the mission of providing close and continuing support to the users of radioactive materials and devices which produce X-ray, laser, and microwave radiation. The sections of this Branch are:

(1) WRAMC Hospital Health Physics Section.

(2) Health Physics Section for WRAIR, AFIP, and MDW.

(3) USAMRIID Health Physics Section.

(4) Diamond Ordnance Radiation Facility (DORF) Health Physics Section.

b. The Nuclear Laboratory and Technical Services Branch has the mission of providing specialized services and support to the Reactor and Survey Branch. The sections of this Branch are:

(1) Radioactivity Analysis Laboratory.

(2) Radioactive Material Control Section.

(3) Instrument Repair and Calibration Section.

(4) Personnel Dosimetry Section.

(5) Supply Section.

4. RADIOLOGICAL EMERGENCY MEDICAL TEAM (REMT). AR 40-13, "Radiological Emergency Medical Teams", together with other directives, assigns the responsibility for maintaining a Primary REMT, augmented by qualified alternate REMT Members, at WRAMC. In conjunction with the Director, Force Development, WRAMC, the Health Physics Officer is responsible for coordination and dispatch of the REMT on request.

ANNEX D (CONTROL MEASURES AND PROTECTION STANDARDS FOR RADIATION EXPOSURE) to WR 40-10 (Health Physics Regulations)

1. REFERENCES.

a. Title 10, Code of Federal Regulations, Part 20, U. S. Atomic Energy Commission Rules and Regulations.

b. AR 40-14, Control and Recording Procedures, Occupational Exposure to Ionizing Radiation.

c. AR 385-30, Safety Color-code Markings and Signs.

2. APPLICABILITY. The definitions and limitations stated in this ANNEX are peacetime standards for occupational exposure of personnel to ionizing radiation. Occupational exposure to ionizing radiation is that exposure incurred as a result of an individual's employment or duty. No portion of this ANNEX shall be interpreted as limiting the intentional exposure of an individual to radiation for the purpose of medical diagnosis or medical therapy of that individual.

C-1 3. DEFINITIONS AND REQUIREMENTS FOR ~~RESTRICTED~~ CONTROLLED AREAS.

a. Restricted Area.

(1) Definition:

(a) Any area to which access will be limited by Health Physics and in which precautionary measures are taken for the purpose of protecting individuals from exposure to ionizing radiation and/or radioactive materials.

(b) Any area so designated by the Health Physics Officer.

(2) Requirements:

(a) Restricted Areas will be posted by Health Physics.

(b) The Restricted Area sign will read:

"~~RESTRICTED~~ AREA"

"Persons who occupy this area for more than 10 hours per week must be registered with the Health Physics Officer"

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b. Radiation Area.

(1) Definition: Any area, accessible to personnel, in which there exists radiation at such levels that a major portion of the body could receive in any one hour a dose equivalent in excess of 2 millirem, or in any five (5) consecutive days a dose equivalent in excess of 100 millirem.

(2) Requirement: Each Radiation Area shall be conspicuously posted with a sign or signs bearing the radiation caution symbol and the words:

"CAUTION"
"RADIATION AREA"

c. High Radiation Area.

(1) Definition: Any area accessible to personnel in which there exists radiation at such levels that a major portion of the body could receive in any one hour a dose equivalent in excess of 100 millirem.

(2) Requirements:

(a) A High Radiation Area shall not be established without the approval of the Health Physics Officer or his representative except in an emergency.

(b) Each High Radiation Area established for more than 30 days shall be equipped with control devices in accordance with ~~para 20.203(e)(2), 10 CFR 20;~~ 10CFR20.203 AND 29CFR1910.96 C-1

(c) Except in an emergency, no individual shall enter a High Radiation Area until the area has been monitored by Health Physics and approval for his entry has been given by Health Physics.

(d) No individual shall enter or remain in a High Radiation Area unless personnel are immediately available in the vicinity to render assistance.

(e) Each High Radiation Area shall be conspicuously posted with a sign or signs bearing the radiation caution symbol and the words:

"CAUTION"
"HIGH RADIATION AREA"

d. Airborne Radiation Area.

(1) Definition: Any room, enclosure, or operating area in which

airborne radioactive materials exist in concentrations in excess of amounts specified in Appendix B, Table 1, Column 1, Title 10, Code of Federal Regulations, Part 20, or any room, enclosure, or operating area in which airborne radioactive material exists in concentrations which, averaged over a number of hours in any week during which individuals are in the area, exceed 25 percent of the amounts specified in the above referenced Code of Federal Regulations ~~(from para 3-1c, AR 385-30)~~. C-1

(2) Requirements:

(a) An Airborne Radioactivity Area shall not be established without approval of the Health Physics Officer or his representative except in an emergency.

(b) The Health Physics Officer shall direct the use of respiratory protective devices, ventilation control measures, and other appropriate actions within Airborne Radioactivity Areas.

(c) Each Airborne Radioactivity Area shall be conspicuously posted with a sign or signs bearing the radiation caution symbol and the words:

"CAUTION"
"AIRBORNE RADIOACTIVITY AREA"

e. Areas Where Radioactive Material is Present.

(1) The provisions of this paragraph apply to materials which have been procured and are useful because of their radioactive component including natural Uranium or Thorium compounds ~~used for histological staining.~~ C-1

(2) Each area or room and principal container in which radioactive material is stored or used shall be conspicuously posted with a sign or signs bearing the radiation caution symbol and the words:

"CAUTION"
"RADIOACTIVE MATERIAL(S)"

(3) Samples, working solutions, laboratory standards, check sources, etc., must be labeled, segregated, or otherwise identified in such a manner that all personnel in the area recognize that radioactive material is present in the object. Radioactive marking tape may be used for this purpose. ~~However, beakers, flasks, test tubes, and other laboratory containers used transiently in laboratory procedures are exempt from labeling requirements.~~ C-1

f. Contaminated Areas.

(1) Definition: Any area, including work areas, which are contaminated with radioactive material to levels in excess of values published in the APPENDIX to ANNEX U of this regulation (Contamination Control and Decontamination Operations).

(2) Requirements.

(a) Any area which may routinely become contaminated during experimental procedures may be posted conspicuously with a sign or signs bearing the radiation caution symbol and the words:

"CAUTION"
"POTENTIALLY CONTAMINATED AREA"

(b) Any area which is contaminated may be conspicuously posted with a sign or signs bearing the radiation caution symbol and the words:

"CAUTION"
"CONTAMINATED AREA"

(c) All areas designated as "Contaminated Areas" or "Potentially Contaminated Areas" will always be regarded as heavily contaminated and must be surveyed by Health Physics following use and decontamination in order to be considered free of contamination.

g. Special Areas of Concern.

(1) At the discretion of the Health Physics Officer, dose rates may be posted for informational purposed at any point.

(2) Specially-designated sinks through which radioactive material may be discharged into the sanitary sewer system shall be conspicuously posted with the radiation caution symbol and the words:

"CAUTION"
"RADIOACTIVE MATERIAL DISPOSAL SINK"

(3) All laboratory receptacles for radioactive waste shall be conspicuously posted with the radiation caution symbol and the words:

"CAUTION"
"RADIOACTIVE WASTE"

(4) Equipment containing or likely to contain radioactive material, and equipment requiring special precautions to perform specific tasks,

will be posted with a sign stating that approval of the Health Physics Officer is required before any maintenance or repair of this item is initiated.

(5) Reactor Areas are those areas adjacent to nuclear reactors, access to which is controlled by the reactor staff and/or Health Physics.

4. RADIATION PROTECTION STANDARDS. Every effort will be made to maintain the radiation dose equivalent as far below the following Radiation Protection Standards as practicable. Positive efforts will be carried out to fulfill this objective; and, determination of necessity will be weighed against the benefits to be expected.

a. Basic Radiation Protection standards adopted for the control of occupational exposures to ionizing radiation include:

(1) The accumulated dose equivalent of radiation to the whole-body; head and trunk; active blood-forming organs; gonads; or lens of the eye will not exceed:

(a) 1.25 rem in any calendar quarter, nor

(b) 5 rem in any 1 calendar year.

(2) The accumulated dose equivalent of radiation to the skin of the whole-body (other than hands and forearms); cornea of the eye; and bone will not exceed:

(a) 7.50 rem in any calendar quarter, nor

(b) 30 rem in any 1 calendar year.

(3) The accumulated dose equivalent of radiation to the hands and wrists or the feet and ankles will not exceed:

(a) 18.75 rem in any calendar quarter, nor

(b) 75 rem in any 1 calendar year.

(4) The accumulated dose of radiation to the forearms will not exceed:

(a) 10 rem in any calendar quarter, nor

(b) 30 rem in any 1 calendar year.

(5) The accumulated dose equivalent or radiation to the thyroid; other organs; tissues; and organ systems will not exceed:

(a) 5 rem in any calendar quarter, nor

(b) 15 rem in any 1 calendar year.

(6) Individual(s) under 18 years of age, females known to be pregnant, and occasionally exposed individual(s) will not be exposed to a whole-body dose equivalent of more than:

(a) 2 millirem in any 1 hour, nor

(b) 100 millirem in any 7 consecutive days, nor

(c) 500 millirem in any 1 calendar year, nor

(d) more than 10 percent of the values in (2), (3), (4), and (5) above, for other areas of the body.

(7) Individuals over 18 years of age but who have not yet reached their 19th birthday may be occupationally exposed to ionizing radiation provided that they do not exceed 1.25 rem dose equivalent to the whole-body in any calendar quarter, nor 3 rem in the 12 consecutive months prior to their 19th birthday.

(8) Women of reproductive capacity should be occupationally exposed only under conditions where the dose equivalent to the abdomen will not exceed:

(a) 1.25 rem in any calendar quarter, nor

(b) 5 rem in any 1 calendar year.

(9) Females known to be pregnant will not be occupationally exposed to ionizing radiation more than 6a(6) above. It is the responsibility of the female employee to advise her employer of the fact that she is pregnant.

b. Radiation Protection Standards adopted for the control of planned occupational exposures to ionizing radiation under emergency situations include:

(1) Life Saving:

(a) The accumulated dose equivalent of radiation to the whole-body should not exceed 100 rem.

(b) The accumulated total dose equivalent of radiation to the hands and forearms should not exceed 300 rem.

(2) Less Urgent:

(a) The accumulated dose equivalent of radiation to the whole-body should not exceed 25 rem.

(b) The accumulated total dose equivalent of radiation to the hands and forearms should not exceed 100 rem.

c. Radiation Protection Standards adopted for the control of non-occupational exposures to ionizing radiation include limiting the use of sources of ionizing radiation such that the accumulated dose equivalent of radiation to the whole-body for an individual in the general population (exclusive of natural background and medical and dental exposures) will not exceed 0.5 rem in any 1 calendar year.

d. Alternate Radiation Portection Standards, less restrictive than those prescribed in 6a above, may be used in special circumstances, when approved by the Surgeon General of the military department concerned.

(1) Proposals for the use of alternate standards will contain complete justification and will describe the procedures by which the alternate standards will be implemented.

(2) Alternate radiation protection standards will not be considered for individuals under 19 years of age, females known to be pregnant, occasionally exposed individuals, women of reproductive capacity or non-occupational exposure to ionizing radiation.

e. When dosimetry indicates that an individual may have received greater than 400 millirem per month whole-body exposure; exposure to unusual concentrations of airborne radioactive material; or the individual believes he may have been exposed to excessive ionizing radiation Health Physics will investigate the circumstances of the exposure. A written report of the investigation will be prepared.

f. When it is determined that an individual may have received a dose of ionizing radiation in excess of the limits stated in para 4 above, or has been exposed to airborne concentrations of radioactive material in excess of 25% of the amounts specified in Appendix B, Table 1, Column 1, 10 CFR 20, when averaged over the number of hours in any week, a report of the findings will be made to the WRAMC Radioisotope Committee

for recommendation for corrective action to be taken. Reports of investigation of overexposures and corrective action will be submitted through Health Services Command, Fort Sam Houston, Texas, to the Surgeon General and the USAEC in compliance with pertinent directives.

g. The exemption of medical exposure from consideration relative to permissible exposure limits of this ANNEX apply only to the patient. All other personnel, such as physicians and technicians administering exposures are subject to the permissible exposure limits listed above.

5. ACCIDENTAL EXPOSURE TO IONIZING RADIATION. The specific procedures and responsibilities relating to the accidental exposure of personnel to known or suspected overexposures are delineated in ANNEX W to this Regulation.

a. Internal Exposure. All persons who are known or suspected to have been internally exposed to quantities of radioactive material in excess of the amounts specified in ANNEX W of this Regulation shall be reported to the Health Physics Officer.

b. External Exposure. All persons who are known or suspected to have been externally exposed to radiation levels in excess of those listed in para 4 above, shall be reported IMMEDIATELY to the Health Physics Officer.

ANNEX E (PERSONNEL MONITORING)
to WR 40-10 (Health Physics Regulations)

1. PURPOSE. The purpose of the personnel monitoring program is to:

a. Quantitatively estimate the magnitude of the exposure of individuals to sources of ionizing radiation.

b. Detect hazardous conditions relating to ionizing radiation exposure not found during radiation protection surveys.

2. SELECTION OF PARTICIPANTS. Personnel selected for personnel monitoring will include:

a. Individuals who are likely to be exposed to sufficient radiation from all occupational exposures to receive an accumulated dose in excess of ten (10) percent of the applicable quarterly basic Radiation Protection Standard (See ANNEX D to these Regulations).

b. Those other individuals selected by the Health Physics Officer.

~~c. Individuals less than 18 years of age who may be occupationally exposed to radiation.~~ C-1

3. DEVICES AND METHODS FOR PERSONNEL MONITORING.

a. A film badge is the primary dosimetric device for personnel monitoring in the Army. It consists of a packet of radiosensitive photographic film in a plastic holder. The following types of film badges are available:

(1) Whole body badge. Sensitive to beta, X-ray, and gamma radiation and worn to measure the exposure received by the whole body.

(2) Wrist badge. Same as the whole body badge except that it is provided with a wrist band so that it can be used to measure the dose to the hands.

(3) Neutron badge. Sensitive to neutron radiations and worn to measure exposure of the whole body to neutrons.

b. Pocket chambers provide a means of obtaining rapid indications of the accumulated dose over short periods of time. The direct reading personnel dosimeter enables individuals to monitor their own accumulated dose.

c. Various audible pocket ratemeters and integrating dosimeters are

also available. These are useful for personnel intermittently exposed to high intensity X-ray or gamma radiation fields.

d. Thermoluminescent dosimeters are useful for dose measurements where other devices are too cumbersome or are otherwise unsuitable.

C-1 e. ~~Biodosimetric~~ BIOASSAY methods may be employed in some cases to assess the quantity of certain radioisotopes which are present within the body. Available techniques include:

(1) Whole body counting.

(2) Selective organ scanning.

(3) ~~Random~~ breath analysis.

C-1 (4) Urinalysis.

(5) FECAL ANALYSIS

4. GENERAL GUIDELINES.

a. Each person, except those ~~being~~ CONTROLLED exposed to a radiation source for medical purposes, who occupies a ~~Restricted~~ Area for more than one (1) day, will wear a film badge unless specifically exempted by the Health Physics Officer.

b. Film badges will not be used for any purpose other than personnel monitoring without the approval of the Health Physics Officer.

c. Only those film badges issued by WRAMC Health Physics shall be acceptable in meeting the requirements of this paragraph for persons coming under the scope of these Regulations.

d. WRAMC film badges shall not be worn by WRAMC personnel when occupationally exposed at other facilities without the consent of the Health Physics Officer, WRAMC. When military or civilian personnel assigned to WRAMC are exposed to ionizing radiation at an installation outside the jurisdiction of WRAMC, they shall insure that the required exposure information is furnished to the custodian of his DD Form 1141 (Record of Occupational Exposure to Ionizing Radiation). Health Physics maintains these records at WRAMC.

C-1 e. Other dosimetric devices and methods may be employed to supplement ~~or replace~~ the film badge under certain circumstances. The Health Physics Officer will designate those individuals authorized to substitute another device or method for the film badge based upon the occupational hazards to which they are exposed.

f. Film badges will be stored in controlled, low dose rate areas when not being worn by the individual.

g. Film badges used for personnel dosimetry will not be worn during medical and dental X-ray exposures or when the individual is to receive a radioisotope treatment. Clearance will be obtained from Health Physics before wearing the film badge after completion of radioisotope treatment procedures.

h. Film badges will not be worn off duty.

i. The film badge will not be intentionally exposed, tampered with, or damaged.

j. Whenever a film badge is thought to have been lost, damaged, accidentally exposed, etc., the Health Physics Officer will be promptly notified. A replacement badge will be issued immediately.

k. The whole body badge should be worn on the torso, fully exposed.

l. The whole body film badge will be worn under the lead apron and the wrist badge under the lead glove when these protective items are worn.

m. The wrist badge should be worn on the side of the wrist facing the radiation source.

n. Film badges should never be carried in the pocket, subjected to mechanical stress, chemical fumes, heat, humidity, or direct sunlight since these can damage the film and give false results.

o. Film badges will be worn only by the individual to whom they are issued.

5. ADMINISTRATION.

a. Application for film badge service will be made to the Health Physics Officer on WRAMC Form 1119 (Film Badge Application and Record of Occupational External Radiation Exposure).

b. Personnel on permanent personnel monitoring service will be subject to medical examinations in accordance with ANNEX F to these Regulations.

c. Health Physics will exchange film badges and transmit the film packets, along with photodosimetry reports, to Lexington-Bluegrass

Depot for monthly development and exposure evaluation.

d. Records of exposures will be maintained as follows:

(1) The Lexington-Bluegrass Army Depot maintains permanent records of all exposure readings and returns the Photodosimetry Report (DA 3484) to the WRAMC Health Physics Officer.

(2) The WRAMC Health Physics Officer maintains DD Form 1141 (Record of Occupational Exposure to Ionizing Radiation) for all military and civilian personnel assigned or attached to WRAMC who are participants in the WRAMC Personnel Monitoring Program in accordance with AR 40-14.

(3) When a DD Form 1141 (Record of Occupational Exposure to Ionizing Radiation) is maintained on an individual by the Health Physics Officer, the jacket of his medical record will be annotated, "Film Badge Wearer, Call Ext. 5107 for information regarding DD Form 1141" and a copy of WRAMC FL 396 (DD Form 1141 Locator) will be placed on the left side of the jacket by the custodian of the individual's medical record.

(4) Records so annotated will NOT be released to the individual when they are clearing post until they have obtained their DD Form 1141 from the Health Physics Office.

(5) The Health Physics Officer will send the photodosimetry reports on non-WRAMC employees (i.e., those persons for whom no DD Form 1141 is maintained by WRAMC, and former WRAMC employees whose DD Form 1141 has been forwarded) to the appropriate custodian of the medical record of each monitored individual at intervals not to exceed a calendar quarter. Reports of zero exposure will not be furnished to monitored visitors, unless requested by the visitor or the custodian of his exposure record.

(6) The "Record of Occupational Exposure to Ionizing Radiation" and records of bioassay results on WRAMC personnel shall be made available to the individual or his superiors upon request to the Health Physics Officer.

(7) The results of bioassay, whole body radioactivity measurements, or estimation of internal exposure to persons registered in the WRAMC Personnel Monitoring Program, shall be sent to the Health Physics Officer who is responsible for posting data to the DD Form 1141 and other dosimetry files.

e. Discontinuation of personnel monitoring will be accomplished by

completion of WRAMC Form 606 (Request for Discontinuation of Film Badge Service) when an individual departs or is assigned duties which, in the opinion of the Health Physics Officer, do not warrant continuation.

6. INVESTIGATIONS.

a. Health Physics personnel will inquire into all excessive, unusual, or unanticipated exposure results.

b. All lost film badges and film badge readings in excess of 200 millirem will be investigated by Health Physics and a written record of the findings will be prepared.

c. When exposures greater than the limits specified in AR 40-14 are found, a formal investigation will be conducted and a brief explanation of the probable cause of the overexposure will be entered on the individual's DD Form 1141 by the Health Physics Officer.

ANNEX F (MEDICAL EVALUATION OF RADIATION WORKERS)
to WR 40-10 (Health Physics Regulations)

1. GENERAL. It is necessary to periodically evaluate the health of radiation workers in order to provide baseline data for future comparisons, supplement the radiation protection program, provide for timely detection of developing medical problems, and for medicolegal reasons. The references cited in paragraph 7 of this ANNEX provide guidelines needed for evaluation of individuals. In order to insure that all radiation workers at WRAMC receive timely and appropriate medical evaluations, a comprehensive program is needed for this installation.

2. PURPOSE. It is the purpose of this Regulation to promulgate the medical evaluation procedures for radiation workers at Walter Reed Army Medical Center based upon applicable regulations, guidelines, and the professional opinions of the members of the Radioisotope Committee.

3. RESPONSIBILITIES.

a. WRAMC Radioisotope Committee is responsible for providing guidance and rendering professional opinions regarding suitable medical evaluation procedures for radiation workers at Walter Reed Army Medical Center.

b. Subcommittee for Medical Evaluation of Radiation Workers of the Radioisotope Committee is responsible for determining medical examination policy for all personnel occupationally exposed to ionizing radiation at WRAMC and determining specific parameters for examination in event of a suspected or actual overexposure to ionizing radiation.

c. Health Physics Officer:

(1) Classifying individual workers at WRAMC into the categories given in para 4 of this Regulation.

(2) Providing up-to-date notification of this classification to the Preventive Medicine Officer, Military Personnel, and the Physical Examination Section, WRAMC.

(3) Detecting working conditions which could result in the accidental ingestion, inhalation, injection, or absorption of radioisotopes by workers, taking action to reduce such hazards, and calling the areas of hazard to the attention of the Preventive Medicine Officer.

d. Preventive Medicine Officer:

(1) Determining the nature of special studies, organ function tests,

and bioassays which might be of benefit in the medical evaluation of workers who are exposed to potential hazards from the use of radioisotopes.

(2) Evaluating the results of such directed studies which are not a part of a routine medical examination.

(3) Insuring that the Physical Examination Section implements the decisions made and considers the results of such studies, assays, and tests as part of the medical examination of these specific workers.

(4) Providing advice and guidance to examining physicians concerning the scope and conduct of medical examination for radiation workers.

(5) Seeking the advice of specialists and/or members of the Radioisotope Committee in any instance where such advice might assist in determining the exact nature of the hazard, the critical organ, and the nature and usefulness of the studies to be undertaken.

4. CATEGORIES OF PERSONNEL. Personnel working with radiation will be divided into five major categories according to the hazard to which they are exposed. The categories are mutually exclusive in most instances; however, some individuals may fall into more than one category. Such individuals should be examined in accordance with requirements of both categories.

a. Personnel Exposed to an External Radiation Hazard. Those individuals who are potentially exposed to X-ray or gamma radiation emanating from X-ray machines, sealed gamma sources, etc.

b. Reactor Workers and Personnel Exposed to Neutron Hazard. This group includes those individuals whose duties could potentially result in exposure to neutron fluxes emanating from reactors and/or neutron sources. The group includes reactor staff members, Health Physics personnel, and experimenters who frequently work with the reactor. A participant in the Army Nuclear Power Program (e.g., Reactor Staff Member, Health Physics Technician, etc.), who has been previously accepted under the provisions of TB MED 267, is included in this group.

c. Personnel Exposed to an Internal Radiation Hazard. This group includes those individuals who, by virtue of their duties, routinely are in the proximity of unsealed radioactive material and, therefore, potentially subject to inhalation, ingestion, absorption, or injection of such material into their bodies.

d. Personnel Exposed to Laser Radiation Hazard. This group includes

those individuals who, by virtue of their duties, routinely are in the proximity of hazardous laser devices.

e. Personnel Exposed to Microwave Radiation Hazard. This group includes those individuals who, by virtue of their duties, routinely are in the proximity of designated hazardous microwave areas.

5. MEDICAL EVALUATIONS.

a. Initial Examination. Preplacement/pre-employment medical examinations are required.

(1) For workers exposed to ionizing radiation hazards, this examination should include a routine medical examination using SF 88 and 89 for military personnel and SF 78 for civilian personnel, a review of prior occupational exposure, and a description of any unusual exposure to ionizing radiation resulting from previous occupations, accidents, or diagnostic procedures. Any therapeutic exposure will be listed by the dosage and the areas treated. This information in diagnostic and therpeutic radiation will be recorded as a portion of the history, but will not be entered on DD Form 1141 (Record of Occupational Exposure to Ionizing Radiation). Sufficient blood counts (white cell count with differential, and, hemoglobin) to establish a baseline will be performed. The following additional examinations will be performed for the groups indicated:

(a) Reactor Workers and Personnel Exposed to a Neutron Hazard will receive a specific ophthalmological examination to include corrected visual acuity for vision; slit lamp examination of the lens with the pupil dilated; examination of the fundus with an ophthalmoscope with the pupil dilated; survey for visual field defects when abnormal fundus findings, which are deemed capable of causing such defects, are detected; fundus photography, if available, of all abnormal fundus finding. A test for color vision will also be administered.

(b) Personnel Exposed to an Internal Radiation Hazard may receive whole body count, bioassay studies, selective organ scans and/or other appropriate additional studies if directed for that individual by the Preventive Medicine Officer.

(2) Personnel Exposed to Laser Radiation Hazards shall havea preplacement medical examination, a termination of employment examination, and be included in an occupational vision conservation program which encompasses thorough general ophthalmologic examinations at regular intervals. Such examinations shall include: Recording visual acuity with correction (if below 20/40, check for improvement with pin-hole or $\pm$ 0.50 spheres and 125 X-cyl); Dilating pupil and examining fundus care-

fully; Photographing or carefully describing or drawing any lesions seen; Performing slit lamp examination if the individual is potentially exposed to infrared or ultraviolet laser radiation.

(3) Personnel Exposed to Microwave Radiation Hazard. In consideration of possible biological effects from excessive exposure to microwave fields of power densities greater than 10 mW/cm2, a specific preplacement and periodic medical examination program is desired for potentially exposed personnel, both military and civilian. For this purpose, the examination should consist of a routine physical examination, plus a comprehensive ophthalmological examination, including evaluation of ocular notility, media and fundus, corrected visual acuity for near and far vision, and slit lamp examination of the lens with the pupil widely dilated.

The decision as to the acceptability of the individual into the occupational program will be rendered by the examining physician(s). The examining physician(s) may defer the decision as to the acceptability of an individual by referring the results of his examination to the Subcommittee for Medical Evaluation of Radiation Workers for final decision.

b. Periodic Examination.

(1) Routine physical examinations for all radiation workers exposed to an ionizing radiation hazard, whether military or civilain, are to be administered on the basis of applicable regulations for military personnel every 3 years.

(2) For workers exposed to microwave fieldss of power densities greater than 10 mW/cm2, periodic eye examinations will be conducted every 2 years at such other times as there is reason to believe that eye damage may have occurred.

(3) For workers exposed to laser radiation, periodic eye examinations will be conducted every two years or at such other times as there is reason to believe that eye damage may have occured.

c. Special Examinations. Routine bioassay, scanning, whole body counting, or other special studies of personnel will be restricted to those tests specifically designated on an individual basis at the discretion of the Commander or his representative.

d. Final Examination. At the termination of assignment of an individual to a position which warrants classification as a radiation worker, a final examination will be conducted, primarily for medicolegal considerations.

6. MEDICAL SURVEILLANCE OF OCCUPATIONALLY EXPOSED PERSONNEL.

a. Special Cases. If the Health Physics Officer identifies areas of particular hazard from radioisotopes, especially areas of potential internal hazard from radioisotopes, he will take appropriate action to minimize the hazard and will advise the Preventive Medicine Officer of the hazard. The Preventive Medicine Officer, seeking whatever consultation he deems necessary, will direct the appropriate additional studies, organ function tests, bioassays, whole body counts and/or selective organ scans which might be of medical benefit in the evaluation of suspected exposure of the individual. He will insure that such studies are conducted and that the results are evaluated by well-trained professional personnel.

b. Consultation. Professional advice in the area of radiation exposure is available from Chief, Ophthalmology; Chief, Radiation Therapy; and/or Chief, Nuclear Medicine Clinic. Any physician engaged in the evaluation of radiation workers may seek the advice of any of these individuals to assist in such evaluations.

c. Reports. Abnormal medical findings discovered during medical examinations of radiation workers will be IMMEDIATELY reported to the Subcommittee for appropriate action. The Health Physics Officer (Ext. 5107/5161) will coordinate such reporting.

7. REFERENCES.

a. AR 40-5, Preventive Medicine.

b. AR 40-14, Control and Recording Procedures, Occupational Exposure to Ionizing Radiation.

c. AR 40-46

d. AR 40-501, Standards of Medical Fitness.

e. AR 40-583

f. AR 50-5, Nuclear Surety.

g. TB MED 270, Control of Hazards to Health from Microwave Radiation.

h. TB MED 279, Control of Hazards to Health from Laser Radiation.

i. Medical Supervision of Radiation Workers, FAEA STI/Pub 201.

ANNEX G (PERSONNEL RELIABILITY PROGRAM)
to WR 40-10 (Health Physics Regulations)

1. PURPOSE. The purpose of this ANNEX is to implement the Human Reliability Program at Walter Reed Army Medical Center.

2. APPLICABILITY. This ANNEX is applicable only to those individuals who are assigned to WRAMC to fill nuclear duty positions.

3. DEFINITIONS. For the purpose of this ANNEX, the following definitions apply:

a. Nuclear Duty Position. Includes those duty positions directly involved with the operation of Army nuclear reactors and those duty positions filled by personnel who are trained as nuclear reactor operators.

b. Unit Commander. The military or civilian supervisor of a unit, organization, activity, or depot.

c. Personnel Reliability Program. A program designed to insure that only personnel who meet high standards of suitability are assigned to nuclear duty positions to preclude degradation of system reliability of nuclear reactor systems.

4. RESPONSIBILITIES.

a. The Health Physics Officer is assigned staff responsibility for the implementation of the Human Reliability Program at WRAMC.

b. The Unit Commander will:

(1) Obtain the assistance and advice of the Health Physics Officer when technical proficiency is required to accomplish actions, formulate policy, or make decisions relative to personnel filling nuclear duty positions.

(2) Provide the continuing evaluation of, and accomplish those administrative actions for, personnel assigned to nuclear duty positions in accordance with the procedure described in AR 50-5.

(3) Implement temporary or permanent disqualification action as appropriate upon recommendation of the Health Physics Officer.

c. The Director, Force Development, WRAMC, will provide the Unit Commander or immediate supervisor, as appropriate, any adverse information that is available to him which potentially affects the human reliability of an individual assigned to a nuclear duty position.

d. The Attending Surgeon's Office and Physical Examination Section will review records in accordance with para 2-4a(2), AR 40-403, and will carefully screen the records to evaluate the individual's medical history in relation to criteria for nuclear duty assignement (Chapter 3, AR 50-5), and will provide the Unit Commander or immediate supervisor, as appropriate, any information available to them concerning an individual which may affect his human reliability.

e. The Chief, Military Personnel Branch, WRAMC, will forward to the Unit Commander for appropriate consideration any adverse information which may be prejudicial to assignment of an individual to a nuclear duty position, and will assure compliance with AR 50-5.

5. REFERENCES.

a. AR 40-403, Health Records

b. AR 50-5, Nuclear Surety

c. AR 385-80, Nuclear Reactor Health and Safety

ANNEX H (PREGNANCY SURVEILLANCE PROGRAM)
to WR 40-10 (Health Physics Regulations)

1. Female radiation workers are subject to the pregnancy surveillance program. It is the responsibility of both the individual and her supervisor to notify the Health Physics Officer, WRAMC, immediately upon learning of a confirmed pregnancy.

2. In cases where the pregnant employee is exposed to ionizing radiation, the Preventive Medicine Officer and the Health Physics Officer will survey the working environment and will, in conjunction with the employee's personal physician, determine the advisability of her continuing work in this environment for the duration of her pregnancy.

3. The Preventive Medicine Officer will make specific recommendations to the appropriate personnel branch for a change in working environment during pregnancy when it is considered medically desirable in individual cases.

ANNEX I (TRAINING AND EXPERIENCE OF RADIOISOTOPE USERS AND X-RAY WORKERS) to WR 40-10 (Health Physics Regulations)

1. PURPOSE. The purpose of this ANNEX is to establish the standards of training for all personnel who work with radioisotopes and X-ray at Walter Reed Army Medical Center.

2. GENERAL. The standards of training for personnel working with radioisotopes and X-ray at WRAMC have been established by the Radioisotope Committee. The training outlined below, or its equivalent, is considered prerequisite for individuals who work in categories described. Exception to these requirements may be granted on an individual basis by, and at the discretion of, the WRAMC Radioisotope Committee.

3. DEFINITIONS.

a. Human Use - See definition, para 3d, ANNEX A to these Regulations.

b. Non-human Use - See definition, para 3e, ANNEX A to these Regulations.

c. Principal User - See definition, para 3f, ANNEX A to these Regulations.

d. Co-worker - See definition, para 3g, ANNEX A to these Regulations.

e. Trainee - See definition, para 3h, ANNEX A to these Regulations.

f. Technician - See definition, para 3i, ANNEX to these Regulations.

g. Health Physics - See definition, para 3j, ANNEX A to these Regulations.

4. COURSES OF INSTRUCTION OFFERED AT WRAMC.

a. Health Physics Aspects of Radioisotope Use. This course of instruction is designed to be given to all personnel who work with radioisotopes. It provides the minimum training required for the safe handling of radioisotopes and protection of the individual from external and internal sources of ionizing radiation. A working knowledge is provided of the principles and practices of radiation protection, the biological effects of radiation, basic terminology, mathematics and calculations used in measurement of radioactivity, nuclear instrumentation, personnel monitoring devices and techniques, AEC and Department of Army Regulations governing radiation protection, and the role of WRAMC Health Physics. This course will be conducted by WRAMC Health Physics.

b. Radioisotope Users Course. This is an advanced course of instruction designed for physicians and researchers who will be responsible for determining the methods and techniques for the use of radioactive materials. This course of instruction, or its equivalent, is considered essential to the qualifications of a Principal User or Co-worker. Experience is obtained with dose calculations, calculations based on the rates of radioactive decay, shielding determinations, laboratory and experimental design, statistical considerations of radioactive decay, formulation of laboratory rules and safe working practices, and the role of a Principal User of radioactive materials at WRAMC. This course will be conducted at WRAMC Health Physics, and will be attended by all Principal Users for whom proof of equivalent training has not been filed with Health Physics, WRAMC.

c. Radiation Instrumentation and Specialized Instruction. This consists of a series of subcourses, each of which is designed around a particular type of radiation instrumentation. Those subcourses dealing with detection systems present the basic principles of the system to be investigated and practical experience through one or more laboratory exercises which are performed by the student to demonstrate certain aspects of the detector system which is investigated. A laboratory report is provided for evaluation by Health Physics to insure that the student has obtained an understanding of those principles involved. These subcourses will be monitored by WRAMC Health Physics and are available to physicians, researchers, and technicians. Individual instruction is provided as needed.

d. Clinical Practical Experience. This is comprised of a series of subcourses concerned with different clinical studies. Each of these is obtained under the direct supervision of a Principal User engaged in that type study. Each is organized as needed and has as a corequisite the subcourses of the Radiation Instrumentation and Specialized Instruction phase which pertain to the instrumentation used in the determination. These courses are provided only for physicians. As many subcourses may be taken as are needed by the respective physician.

e. X-ray Protection Instruction. This instruction is administered annually to those personnel who work with X-ray sources of ionizing radiation. The biological effects of radiation and selected aspects of radiation protection which are particularly important to the X-ray operator are described. The instruction is mandatory for all personnel who operate X-ray producing devices and is optional for other personnel working with X-ray machines. This instruction will be presented by WRAMC Health Physics.

5. TRAINING AND EXPERIENCE REQUIRED OF INDIVIDUALS.

a. All individuals working with radioisotopes will have received the

Health Physics Aspects of Radiosotope Use course or its equivalent.

b. All individuals operating X-ray machines will receive instruction in X-ray protection or its equivalent.

c. Technicians working with radioisotopes will receive the Health Physics Aspects of Radioisotope Use course and such subcourses of the Radiation Instrumentation and Specialized Instruction as required by their supervisors or the Principal Users under whose authorization they work.

d. Principal Users, Co-workers, Trainees, and Technicians whose only use of radioactive material is as sources in gas chromatography will receive the following, or their equivalent:

(1) Health Physics Aspects of Radioisotope Use.

(2) Radiological Hazards and Protective Techniques Associated with Gas Chromatographs (a subcourse of Radiation Instrumentation and Specialized Instruction).

e. Principal Users, Co-workers, and Trainees (Non-human Use) will receive the following, or their equivalent:

(1) Health Physics Aspects of Radioisotope Use.

(2) Radiation Instrumentation and Specialized Instruction (as required).

(3) RADIOISOTOPE USERS COURSE C-1

f. Principal Users, Co-workers, and Trainees (Human Use) will receive the following, or their equivalent:

(1) Health Physics Aspects of Radioisotope Use.

(2) Radioisotope Users Course.

(3) Clinical Practical Experience in the specific studies for which they are being trained, to include as corequisites those subcourses from the Radiation Instrumentation and Specialized Instruction phase which are applicable to the instrumentation used in the determinations for which they are being trained.

g. Residents and interns receive only familiarization instruction in the use of radioisotopes and are exempted from the provisions of this ANNEX. The training received does not qualify them for independent use of radioisotopes.

h. Physicians in training at WRAMC to become Chiefs of ~~Radioisotope~~ NUCLEAR MEDICINE

Clinics require training of broader scope and greater depth than that provided at Walter Reed Army Medical Center. These physicians may receive, as part of their training, the 4 week Medical Radioisotope Course at Oak Ridge Associated Universities, Oak Ridge, Tennessee; Medical Officers Course in Radioisotope Technique and Nuclear Medicine (8 weeks) at National Naval Medical Center, Bethesda, Maryland; or equivalent training.

6. QUALIFICATION AND CERTIFICATION.

a. Personnel may become qualified in the use of radioisotopes through the receipt of training at WRAMC or through constructive credit granted by the Radioisotope Committee for previous training and experience which parallels the comparable WRAMC training.

b. Certification of satisfactory completion of appropriate training which is conducted under the auspices of Health Physics will be made by that organization.

c. In the case of physicians, evidence of satisfactory completion of the clinical practical experience will be provided to Health Physics by the Principal User under whom the experience is obtained.

d. Records of training and experience of radioisotope workers will be maintained by Health Physics.

e. Upon the completion of the blocks of instruction, appropriate Department of Army Certificates of Training will be issued. Appropriate entries will be made in Personnel Records.

7. REFERENCES.

a. APPENDIX C, USAEC Licensing Guides - Medical Programs.

b. TR 31 - Training in Radiological Protection: Curricula and Programming, International Atomic Energy Agency, Vienna, 1964.

c. 10 CFR 30 - Rules of General Applicability to Licensing of By-product Material, Rules and Regulations of the US Atomic Energy Commission.

d. TB MED 62 - Diagnostic X-ray Protection.

e. NBS Handbood Number 93.

f. NCRP Reports Numbered: 8, 22, 28, 30, 33, 34, 35, 36, and 40.

g. ICRU Reports Numbered: 10c, 10d, and 10e.

ANNEX J (REFERENCES)
to WR 40-10 (Health Physics Regulations)

The following listed references are general in nature and pertain to these Regulations as a whole; additional references which are more specific are cited in the ANNEXES.

AR 11-21 Environmental Pollution Abatement
AR 40-7 Use of Investigational Drugs in Humans
AR 40-13 Radiological Emergency Medical Team
AR 40-14 Control and Recording Procedures, Occupational Exposure to Ionizing Radiation
AR 40-27 Personnel Radiation Exposure
AR 40-37 Radioisotope License Program (Human Use)
AR 40-44 Microwave Oven Radiation Protection Program
AR 40-46 Control of Health Hazards From Lasers and Other High Intensity Optical Sources
AR 40-61 Medical Materiel Policies and Procedures
AR 40-403 Health Records
AR 50-5 Nuclear Surety
AR 55-55 Transportation of Radioactive and Fissile Materials Other Than Weapons
AR 55-355 Military Traffic Management Regulation
AR 70-25 Use of Volunteers as Subjects of Research
AR 385-30 Safety Color-Code Markings and Signs
AR 385-80 Nuclear Reactor Health and Safety Program
AR 700-52 Licensing and Control of Sources of Ionizing Radiation
AR 700-58 Report of Packaging and Handling Deficiencies
AR 700-64 Radioactive Commodities in the DOD Supply Systems
AR 725-1 Special Authorization and Procedures for Issue, Sales, and Loans
AR 755-15 Disposal of Unwanted Radioactive Material
SB 11-206 Film Badge (Photodosimetry) Supply and Service for Technical Radiation Exposure Control
TB MED 62 Diagnostic X-Ray, Therapeutic X-Ray and Gamma Beam Protection for Energies Up to 10 Million Electron Volts
TB MED 223 Respiratory Protective Devices
TB MED 232 Protective Measures for Radioactive Material Used in Self-Luminous Light Sources
TB MED 249 Protection Against Radiations from Sealed Gamma Sources
TB MED 267 Guidelines for Medical Evaluation of Applicants and Personnel in the Army Nuclear Power Program
TB MED 270 Control of Hazards to Health from Microwave Radiation
TB MED 279 Control of Hazards to Health from Laser Radiation
TB 750-237 Identification of Radioactive Items in the Army Supply System

TM 3-220 Chemical, Biological, and Radiological (CBR) Decontamination

TM 3-261 Handling and Disposal of Unwanted Radioactive Material

TM 55-315 Transportability Guidance for Safe Transport of Radioactive Materials

Title 10 Code of Federal Regulations - Rules and Regulations of the USAEC

Title 49 Code of Federal Regulations - Rules and Regulations of the DOT

Reports of the Federal Radiation Council (FRC)

Reports of the National Council on Radiation Protection and Measurement (NCRP)

Reports of the International Commission on Radiation Units and Measurements (ICRU)

Handbooks of the National Bureau of Standards (NBS)

Recommendations of the International Commission on Radiological Protection (ICRP)

ANSI N44.2 - 1973 American National Standard of Leak-testing Radioactive Brachytherapy Sources

ANNEX K (RECEIPT, TRANSFER AND SHIPMENT OF RADIOACTIVE MATERIAL) to WR 40-10 (Health Physics Regulations)

1. PURPOSE. The purpose of this ANNEX is to familiarize Principal Users and other personnel with the Health Physics aspects of radioactive material procurement, receipt, transfer, and shipment.

2. DEFINITIONS. For the purpose of this ANNEX the following definitions apply:

a. Radioactive material. Any material which undergoes spontaneous nuclear disintegration with emission of corpuscular or electromagnetic radiations. Radioactive material includes naturally-occurring isotopes, special nuclear material, byproduct material, accelerator-produced isotopes, source material, and items contaminated with radioactive material.

b. Radioactive Commodity. An item of US Government property to which a Federal Stock Number (FSN) has been assigned, composed in whole, or in part, of radioactive material.

c. US Atomic Energy Commission License. A License issued to WRAMC which permits the receipt, possession, use, transfer, storage, and disposal of certain radioactive material at WRAMC subject to specific conditions. USAEC Licenses are issued for byproduct material, source material, and special nuclear material, ~~etc.~~ C-1

d. Department of the Army Authorizations. An Authorization issued by the Department of the Army to WRAMC which permits the receipt, possession, use, transfer, storage, shipment, and disposal of naturally-occurring and accelerator-produced radioactive material at WRAMC.

e. WRAMC Radioisotope Authorization. An Authorization issued by the WRAMC Radioisotope Committee to an individual within the authority of the USAEC Licenses and DA Authorizations held by WRAMC to receive, possess, use, transfer, store, and dispose of radioactive material. Radioisotope Authorizations are subject to the conditions of the USAEC Licenses, the Code of Federal Regulations, Department of the Army Regulations, and WRAMC Health Physics Regulations.

3. GENERAL.

a. The Health Physics Officer has custodial responsibility for all radioactive material at WRAMC.

b. The Health Physics Officer, in coordination with the WRAMC Transportation Officer, controls the movement of all radioactive material onto,

off of, and within the installation.

c. The Health Physics Officer, in coordination with the Director of Logistics, controls the procurement, receipt, and transfer of all radioactive material at WRAMC.

d. Questions concerning procurement, receipt, transfer, and shipment should be directed to the Chief, Radioactive Material Control Section, Health Physics, WRAMC, Ext. 5104 or 5107.

4. PROCUREMENT OF RADIOACTIVE MATERIAL.

a. General.

(1) A Principal User may procure for use at WRAMC only those radioisotopes currently authorized for his use by the WRAMC Radioisotope Committee, subject to the limitations of his Authorization.

(2) The maximum quantity which may be ordered at any one time is limited by the maximum activity of that radioisotope which the User is authorized to possess unless arrangements have been made with the Health Physics Officer.

(3) Receipt and/or transfer of gifts containing radioactive material shall not be accomplished without prior approval of the Health Physics Officer. This has particular application in those instances where normal supply channels are not utilized. All gifts will be delivered to the locations shown in para 4c(3), below.

b. Principal Users.

(1) The Principal User shall submit a completed DA Form 14-115 (Purchase Request and Commitment) through his supply channels for the procurement of all radioactive materials.

(2) In addition to the information required by WR 715-2, each DA Form 14-115 (See the APPENDIX to this ANNEX for Sample) shall contain the following:

(a) Radionuclide, chemical form, and total activity (Activity is given as microcurie (uCi), millicurie (mCi), curie (Ci), microgram (ug), milligram (mg), gram (g), or milligram-radium equivalent (mg Ra eq), as appropriate).

(b) WRAMC Radioisotope Authorization Number.

(c) Date required or delivery date.

(d) Instructions to the vendor to ship to the locations shown in para 4c(3).

(e) The requesting activity (Principal User) SHALL NOT indicate the USAEC License Number or DA Authorization Number. The Chief, Radioactive Material Control Section, Health Physics, will designate the applicable USAEC License or DA Authorization Number for the radioactive material being procured.

(3) With regard to the procurement or disposal of radioactive commodities, the Principal User and/or Supply Control Branch will coordinate with the Health Physics Officer prior to the submission of DA Form 2765 or 2765-1 (Request for Issue or Turn-in).

c. Purchasing.

(1) Prior to placing any orders for radioactive material, purchasing personnel will request approval from the Health Physics Officer or his authorized representative.

(2) In order to obtain approval, Health Physics must be furnished with the following information from the DA Form 14-115:

(a) WRAMC Authorization Number.

(b) Identity of the radioisotope(s) being requested.

(c) Total activity of the radioisotope desired.

(d) Delivery date of the requested radioactive material.

(3) After approval has been granted, the authorized purchasing personnel will place the order and request delivery by the required date, with instructions for the vendor to ship to the following address (unless specifically exempted as authorized by the Health Physics Officer):

(a) For any item destined for any organization located at WRAMC:

1 For items to be delivered by mail:

Health Physics Officer
Bldg 188, Forest Glen Section
Walter Reed Army Medical Center
Washington, D. C. 20012

2 For items to be delivered by all other means:

Health Physics Officer
Bldg 188, 2681 Linden Lane
Forest Glen Section
Walter Reed Army Medical Center
Silver Spring, Maryland 20910

(b) For any item destined for USAMRIID, Fort Detrick, Maryland:

Transportation Officer
US Army Medical Research Institute of Infectious Diseases
Fort Detrick, Maryland 21701

(c) For any item destined for Andrew Rader Clinic, Fort Myer, Virginia:

Andrew Rader Army Clinic
Bldg 525
Fort Myer, Virginia 22211

(d) Any item requiring special handling or pick-up by Health Physics, WRAMC, must be coordinated with the Health Physics Officer.

(4) The personnel authorized to order radioactive material will, unless otherwise instructed by the Health Physics Officer, furnish Health Physics with copy #3 of the DA Form 14-115 or a facsimile having the following additional information, as appropriate:

(a) Charge Accounts:

1 Name of person placing order

2 Purchase Request number

3 Call number

4 Purchase/Delivery Order number

(b) Non-charge Accounts

1 Name of person placing order

2 Purchase Request number

3 Purchase/Delivery Order number

5. RECEIPT OF RADIOACTIVE MATERIAL.

a. All incoming shipments will be received in Controlled Areas. The following procedures will be followed:

(1) Primary containers will be monitored with appropriate precautions for leakage, dose rates, total activity, packing material contamination and labeling. This process will be accomplished by visual inspections, smears and radiation detection equipment.

(2) The labeling of the package, the packing slip, and other documents will be compared with the DA Form 14-115 or DA Form 2765 to insure the accuracy of the shipment.

(3) The exposure rate at one (1) foot from the primary unshielded container and at one (1) foot from the primary container enclosed in the protective shield supplied by the vendor will be recorded on WRAMC Form 682 (Health Physics Inspection and Receipt Tag).

(4) The shipment is then transported to the appropriate Health Physics Section for delivery to the user.

(5) Appropriate entries are made in the Radioactive Material Receipt Files and Inventory Records.

b. If shipments are found to be contaminated, they will be decontaminated to acceptable levels by Health Physics prior to delivery to the user.

c. Under no circumstances will an incoming shipment of radioactive material be refused when delivered.

d. The user should note the exposure rate measurements posted on the WRAMC Form 682 and govern his handling and storage of the radioactive material accordingly. If no protective shield is furnished, then NS (No Shield) is posted on the WRAMC Form 682.

e. The Health Physics inspection does not constitute an assay or an evaluation of the pharmaceutical quality of the radionuclide. Special arrangements may be made with the Health Physics Officer to have radioactive material assayed.

f. The Radioactive Material Control Section, Health Physics, operates during normal WRAMC duty hours. After duty hours, radioactive material is to be received only by the Military Police Detachment, Forest Glen Section, WRAMC.

g. Health Physics does not routinely provide special delivery of incoming shipments of radioactive material (i.e., after duty hours delivery, or non-routine deliveries during duty hours). Therefore, the Principal User must notify the Health Physics Officer if an urgent or specially refrigerated shipment is expected. The Health Physics Officer will insure the prompt inspection and survey of the shipment so that the delivery will not be unduly delayed. Routine delivery of radioisotope shipments are made at 1100 hours and 1430 hours each duty day by Health Physics to the users at WRAMC.

6. TRANSFER OF RADIOACTIVE MATERIAL.

a. Transfer of radioactive material within WRAMC shall be accomplished only between persons authorized to use those radioisotopes by the WRAMC Radioisotope Committee.

b. Transfer of radioactive material between Principal Users at WRAMC and other activities or agencies outside the jurisdiction of WRAMC (e.g., NIH, NBS, NNMC, VA Hospital, etc.) shall be coordinated with the Health Physics Officer. The Principal User, in coordination with the appropriate Health Physics Section, will prepare a DA Form 2791-R (Radioactive Material Movement) for the transport of radioactive material. Health Physics must have proof in writing that the recipient is licensed or authorized to possess the radioactive material, by the USAEC or other authority, before the transfer is accomplished.

c. Transfer of all adapted or experimental items of equipment containing radioactive material that are to be returned to a vendor for repair, return or replacement, and/or disposal shall be processed in the following manner:

(1) The item containing the radioactive material shall not be removed from its normal location without the approval of the Health Physics Officer.

(2) The Principal User shall contact the Radioactive Material Control Section, Health Physics, Ext. 5104 or 5107, for instructions.

(3) The Principal User shall prepare a DA Form 2496 (Disposition Form) addressed to the Health Physics Officer, WRAMC, which shall contain the following information:

(a) A statement requesting that the equipment be returned to the appropriate vendor for repair and return, or returned to the vendor for replacement and/or disposal.

(b) Complete address of the vendor, e.g.:

Jarrell-Ash Company
590 Lincoln Street at Route 128
Waltham, Massachusetts 02154
ATTN: Mr. Reed

(c) Make and model number of the equipment, e.g.:
Argon-Diode Detector, Model 28-752

(d) Serial number of the equipment and/or the radioactive source.

(e) The radionuclide present, e.g.: 90-Sr, 3-H, 226-Ra, etc.

(f) The total activity of the source (uCi, mCi, Ci, ug, mg, g, or mg Ra eq, as appropriate).

(4) The Principal User shall coordinate with his Supply and Service Division in the preparation of a DA Form 2407 (Maintenance Request - MR) to be submitted to the Combined Maintenance Branch (CMB), WRAMC. It is imperative that the MR contain the make, model, serial number, Federal Stock Number (FSN) of the item, radioisotope, total activity, and description of the work to be performed.

(5) It is the responsibility of the Combined Maintenance Branch and Purchasing and Contracting (P&C) Branch, WRAMC, to coordinate with the Supply Control Branch (SCB) in completing the necessary documents for shipment of the equipment. These documents are:

(a) Shipping Document. DD Form 1348-1 or DD Form 1149-4 with fund citation and Purchase Order number.

(b) DD Form 1155. Order for Supplies and Services.

(6) The CMB, WRAMC, shall notify the Chief, Radioactive Material Control Section, Health Physics (Ext. 5104 or 5107), to coordinate the pick-up of the shipping documents from CMB, WRAMC, and the equipment from the Principal User.

(7) All adapted or experimental equipment containing radioactive material being returned to WRAMC by the vendor shall be shipped to the address given in para 4c(3)(a)1, above.

7. SHIPMENT OF RADIOACTIVE MATERIAL.

a. Health Physics will process all outgoing shipments identified as

containing radioactive material and returnable containers for radioactive material departing WRAMC.

b. The Principal User shall coordinate with his Supply and Service Division and SCB in the preparation of the Shipping Document.

c. The Chief, Radioactive Material Control Section, Health Physics, or his representative will insure that the container is properly identified, described, packaged, and labeled in accordance with existing regulations and that the shipping documents and instructions are properly forwarded.

d. The Chief, Radioactive Material Control Section, Health Physics, will coordinate the shipment with the Transportation Officer.

8. REFERENCES.

a. Title 10, Code of Federal Regulations, Rules and Regulations of the US Atomic Energy Commission.

b. Title 42, Code of Federal Regulations, Rules and Regulations of the US Public Health Service, Department of Health, Education and Welfare.

c. Title 49, Code of Federal Regulations, Rules and Regulations of the Department of Transportation.

d. AR 37-108, General Accounting and Reporting for Finance and Accounting Offices.

e. AR 710-2, Materiel Management for Using Units, Support Units and Installations.

f. TM 38-750, The Army Maintenance Management Systems.

g. WR 40-19, Radioisotope Committee.

h. WR 750-1, Maintenance of Supplies and Equipment.

i. WR 750-2, Purchasing and Contracting Services.

j. WR 55-1, Transportation and Travel.

k. WR 40-610, The Medical Care Support Equipment Program (MEP).

PURCHASE REQUEST AND COMMITMENT
(AR 37-108)

PURCHASE INSTRUMENT NUMBER	REQUISITION NUMBER	DATE	PAGE OF PAGES
	X318-200-XX	XX Nov XX	1

TO:	THRU:	FROM:
Purchasing and Contracting Officer	C, Materiel Branch, Log Div, WRAMC	W71PEC-X318-200-XX-X-XXXX

IT IS REQUESTED THAT THE SUPPLIES AND SERVICES ENUMERATED BELOW OR IN ATTACHED LIST BE: (ALL "X's" REPRESENT A NUMBER)

PURCHASED FOR	DELIVERED TO	NOT LATER THAN *(Date)*
INITIATING ACTIVITY	* SEE BELOW	SPECIFIC DATE ITEM REQUIRED

THE SUPPLIES AND SERVICES LISTED BELOW CANNOT BE SECURED THROUGH NORMAL SUPPLY CHANNELS OR OTHER ARMY SUPPLY SOURCES IN THE IMMEDIATE VICINITY, AND THEIR PROCUREMENT WILL NOT VIOLATE EXISTING REGULATIONS PERTAINING TO LOCAL PURCHASES FOR STOCK; THEREFORE, LOCAL PROCUREMENT IS NECESSARY FOR THE FOLLOWING REASON: *(Check appropriate box and complete item)*

	LOCAL PURCHASES AUTHORIZED AS THE NORMAL MEANS OF SUPPLY FOR THE FOREGOING BY: AR 40-61		REQUISITIONING DISCLOSES NONAVAILABILITY OF ITEMS AND LOCAL PURCHASE IS AUTHORIZED BY

EMERGENCY SITUATION PRECLUDES USE OF REQUISITION CHANNELS FOR SECURING ITEM.

NAME AND TELEPHONE NUMBER OF PERSON TO CALL FOR ADDITIONAL INFORMATION

ITEM	DESCRIPTION OF SUPPLIES OR SERVICES	QUANTITY	UNIT	ESTIMATED UNIT PRICE	ESTIMATED TOTAL COST	a	b	c	d	e	f	g	h
K-9	FEDERAL SUPPLY CLASS NOMENCLATURE, DESCRIPTION, MAKE, MODEL, CATALOG #, ETC. SUGGESTED SOURCE: MANUFACTURER DISTRIBUTOR DEALER WRAMC AUTH # XXX						LEAVE ENTIRE SECTION BELOW BLANK						
	*SHIP TO: Health Physics Officer Bldg 188, 2681 Linden Ln. Forest Glen Section Walter Reed Army Medical Center Silver Spring, MD 20910												
	APPROVED: NAME AND GRADE OF INITIATING ACTIVITY PROPERTY OFFICER												
	APPROVED: NAME AND GRADE OF DIVISION DIRECTOR												

SAMPLE

THE FOREGOING ITEMS ARE REQUIRED NOT LATER THAN AS INDICATED ABOVE FOR THE FOLLOWING PURPOSE:

NAME OF PATIENT, ON-GOING PROJECT OR PROGRAM/FUNDS ARE AVAILABLE

DISCOUNT

DATE	TYPED NAME AND GRADE OF INITIATING OFF.	SIGNATURE	
	PROPERTY BOOK OFFICER OR C, SUP & SVC DIV TELEPHONE NO.		DELIVERY SCHEDULE
DATE	TYPED NAME AND GRADE OF SUPPLY OFF.	SIGNATURE	
	C, MATERIEL BRANCH		PURCHASE ORDER NUMBER

DA FORM 1 APR 68 14-175 REPLACES EDITION OF 1 MAY 55, WHICH WILL BE USED.

APPENDIX to ANNEX K

WR 40-10

ANNEX L (ACCOUNTABILITY AND INVENTORY OF RADIOACTIVE MATERIAL AND MACHINES WHICH PRODUCE ~~X-RAY, LASER, AND MICROWAVE~~ IONIZING RADIATION) C-1
to WR 40-10 (Health Physics Regulations)

1. RESPONSIBILITIES.

a. The Health Physics Officer is responsible for the physical inventory and accountability for all radioactive material, ionizing radiation producing devices, ~~lasers, and microwave equipment~~ in accordance with AR 700-52 and AR 40-61. C-1

b. The Health Physics Officer is responsible for insuring that the total inventory of any radioisotope on hand at any one time does not exceed the possession limitations imposed for that isotope by the USAEC Licenses or DA Authorizations, as appropriate.

c. Each Principal User is responsible for the control, security, and inventory of all radioactive material in his possession at all times. He will insure that the maximum quantity which he has on hand at any one time does not exceed the possession limit stated in his WRAMC Radioisotope Authorization. Quantities in excess of his possession limits will be returned to Health Physics for storage until needed.

2. PROCEDURES.

a. Inventory records will be updated on a quarterly basis at WRAMC.

b. Inventory of radioisotopes used under Non-Human Use Authorizations will be performed as part of one radiation protection survey performed during the quarter. Chief, Radioactive Material Control Section, Health Physics, will consolidate this inventory and Chief, Reactor and Survey Branch, Health Physics, will verify the accuracy of the inventory.

c. Inventory of radioisotopes used under Human Use Authorizations will be inventoried quarterly as of the last working day of the quarter. Chief, Radioactive Material Control Section, will consolidate this inventory quarterly and the Chief, Reactor and Survey Branch, will verify the accuracy of the inventory.

d. Machines and devices which produce ionizing radiation, ~~laser, and microwave radiation~~ will be registered with the Chief, Radioactive Material Control Section, Health Physics, who will maintain a registry in accordance with AR 700-52. This registry will be updated as needed and verified semi-annually. C-1

3. RECORDS.

a. All WRAMC radioisotope inventory records and registry of devices and machines which produce ~~laser, microwave, or~~ ionizing radiation will be maintained by the Chief, Radioactive Material Control Section, Health Physics, in accordance with pertinent directives. C-1

b. Other files and records deemed necessary to effect control of radioisotopes and insure compliance with limits of USAEC Licenses, DA Authorizations, and WRAMC Radioisotope Authorizations are authorized, except that no form may be used at the local level to supplement or replace the ~~DA Form 8-235 (Pharmacy, Drug and Narcotic Stock Record)~~ prescribed in para 3-5, AR 40-61 (Medical Materiel Policies and Procedures). C-1

DA FORM 3862 (CONTROLLED SUBSTANCE Stock RECORD)

ANNEX M (TRANSPORTATION OF RADIOACTIVE MATERIALS)
to WR 40-10 (Health Physics Regulations)

1. PURPOSE. To prescribe general guidelines for the transportation of radioactive material within and from WRAMC and to implement the provisions of AR 55-55 and 49 CFR 171-178.

2. RESPONSIBILITIES.

a. The Transportation Officer, WRAMC is responsible for providing the means by which radioactive materials are transported.

b. The Health Physics Officer is responsible for:

(1) Controlling all radioactive material at WRAMC to include location, transfer, and transportation.

(2) Insuring that packaging meets standards of 49 CFR 173.24 and other pertainent directives.

(3) Insuring that all packaging and accessories which have previously been used for shipments of radioactive materials and are being shipped empty conform to 49 CFR 173.29 and other pertinent directives.

(4) Verifying that removable radioactive contamination does not exceed the limits specified in 49 CFR 173.397.

(5) Assigning Transport Group classifications and the Transport Index to shipments of radioactive materials in accordance with 49 CFR 173.390 and 173.389(i).

(6) Labeling of packages of radioactive materials in the manner prescribed in 49 CFR 173.399, 173.402, and 173.414 and other pertinent directives.

(7) Preparing and/or advising on the preparation of shipping documents for shipment of radioactive material as required.

(8) Releasing shipments to carriers after verifying that the vehicle intended for transport is suitable, in a proper state of repair, placarded in accordance with 49 CFR 177.823(a)(1), and free from any obvious condition which could reasonably impair the safe transport of the cargo. Vehicles not meeting these tests will be immediately reported to the Transportation Officer.

(9) Surveying military vehicles which have been used to transport

radioactive materials for dose rate at any accessible surface and removable radioactive surface contamination in accordance with 49 CFR 177.843 and 173.397 and other pertinent directives.

3. POLICIES.

a. All shipments and transportation requirements for radioactive material will be coordinated with the Health Physics Officer and the Transportation Officer.

b. Vehicles transporting radioactive materials:

(1) Will be placarded front, rear, and on each side while it contains radioactive materials with the word "RADIOACTIVE" (Black letters on yellow background, letters not less than 4 inches high using approximately a 5/8-inch stroke and the placard larger than lettering by at least one inch on each side) whenever radioactive material requiring "Radioactive Yellow - III" label is transported and also when radioactive cargo not requiring this label is transported but, in the opinion of the Health Physics Officer, such placards should be displayed.

(2) Will not carry flammables, Class A explosives, pyrotechnics, vegetables, fruit, bagged grains, or other contaminable foodstuffs, with any radioactive material.

(3) Will not be left unattended on a public highway.

(4) Will be subject to inspection prior to loading and must conform to the provision of DD Form 626 (Inspection Report).

(5) Will display ~~a notice on the dash board which states~~ A DA LABEL 135 ON THE DASHBOARD.:

~~WARNING~~
~~THIS VEHICLE IS CARRYING~~
~~RADIOACTIVE MATERIAL~~

C-1

~~When damaged, the package(s) are safe to handle for short periods. In case of accident notify: WRAMC Health Physics, 576-5107.~~

(6) Will carry a copy of DD Form 836 (Special Instructions for Motor Vehicle Drivers) and a copy of the APPENDIX to this ANNEX (Emergency Procedures to follow in Accident and/or Incident Situations).

(7) Will be loaded in such a fashion that the distance between the packages and the driver or any passenger in the cab of the vehicle will

not be less than the distances given in Table 6, paragraph 13b(13), TM 55-315.

(8) Will be loaded such that the load is not likely to become damaged or dislodged during transit.

(9) Will have all packages of radioactive material contained within the cargo portion of the vehicle, i.e., no tailgate loading.

(10) Will be surveyed and decontaminated, if necessary, to the levels prescribed in 49 CFR 177.843 and 173.397, and other pertinent regulations, prior to being returned to general use.

(11) Will be equipped with a portable survey instrument in operating condition during operation to assist in contamination control in event of accident or incident.

(12) Will be operated at a safe speed in conformity with local conditions, but will not exceed posted speed limits under normal operating conditions. During adverse weather or road conditions, the speed of the vehicle will be reduced to that safe for the existing conditions.

c. Passenger-carrying vehicles, including POV and motor vehicles which carry passengers for hire, will NOT be used to transport radioactive materials unless there is no other practicable means of transportation available and then only with the expressed consent of the Health Physics Officer and the Transportation Officer. When passenger-carrying vehicles are authorized for use in transporting radioactive materials, the requirements in para 3b above will be met (49 CFR 177.870).

d. The U.S. Mail and Parcel Post will not be used for shipment of radioactive material except in case of emergency, or for the movement of radioisotopes which meet the requirements specified in 39 CFR 125.2 and para 5a(4), TM 55-315. All such shipments must be coordinated with the Health Physics Officer (para 3-13b, AR 55-55).

4. REFERENCES.

a. AR 55-38 - Reporting of Transportation Discrepancies in Shipment

b. AR 55-55 - Transportation of Radioactive and Fissile Material Other Than Weapons.

c. AR 385-40 - Accident Reporting and Records.

d. 39 CFR, Rules and Regulations of the Postal Service.

e. WR 55-1 - Transportation and Travel.

f. WR 385-2 - Accident Reporting.

g. AR 700-52

h. 49 CFR C-1

i. 10 CFR

APPENDIX (EMERGENCY PROCEDURES TO FOLLOW FOR VEHICLE ACCIDENT/INCIDENT) to ANNEX M (TRANSPORTATION OF RADIOACTIVE MATERIALS)

1. GENERAL. A radiological emergency is any unplanned event which could adversely affect the safe movement of radioactive materials. A severe emergency could result from collision, fire, explosions, or loss of control, e.g., theft, spillage, leakage, and misplacement of the radioactive material. Your first aim should be to protect yourself and others from overexposure and contamination. Second, efforts should be made to confine the contamination to the local area. Although no set of rules is available to handle every conceivable incident, the proper adaptation of the more specific guidance furnished below will minimize the danger to persons and property. In the event there is reason to believe that personnel may have been contaminated and/or overexposed, efforts will be directed toward locating those persons so that any necessary decontamination and medical assistance may be furnished.

2. DEFINITIONS.

a. Accident - Includes any physical damage to the container(s); any overexposure of personnel; or contamination of personnel and equipment in detectable amounts.

b. Incidents - Unexpected events which are not accidents as defined above, but which may increase in hazard severity or, if the unsafe practice or condition is not corrected, may result in a future accident. Incidents include errors committed in handling operations; malfunctions of transport equipment which might result in danger to the loading, if not corrected; malfunction of the container or associated equipment components which degrade safety.

3. STATEMENTS TO CIVIL AUTHORITIES. If queried by civil authorities concerning contents of the vehicle, the operator will state only that the vehicle was transporting small quantities of well-contained radioactive material, either radioisotopes or waste, as the case may be. He will refer all additional questions of this nature to the Health Physics Officer, WRAMC, or his representative.

4. EMERGENCY ACTION IN THE EVENT OF FIRE, EXPLOSION, LEAKAGE OR SPILL.

a. Immediate Action by Vehicle Operator:

(1) Pull out of the line of traffic; DO NOT LEAVE VEHICLE UNATTENDED UPON A PUBLIC HIGHWAY.

(2) Extinquish fire; use dry chemical fire extinguisher.

(3) In case of leakage, try to control spread of liquid by the most practical means.

b. Utilize on-site personnel in order to:

(1) Isolate the area. If necessary, increase the distances indicated on the DD Form 836 to keep personnel out of smoke, leakage, spillage and mists. Establish an exclusion area to protect the general public from exposure to radiation in excess of 2 mR/hr and all detectable contamination.

(2) Render first aid.

(3) Notify the Health Physics Officer, WRAMC (Ext. 576-5107 or 5161).

(4) Notify the Military Police, WRAMC (Ext. 576-2511 or 5348).

(5) Control personnel who may have contacted the fumes, spillage, smoke or dust.

(a) Obtain names and addresses of witnesses and affected individuals.

(b) Discourage smoking, eating, drinking, and leaving until Health Physics personnel arrive.

c. Subsequent Action by the Operator:

(1) Assist the Health Physics personnel as required.

(2) Document the accident. The operator will make out an accident report as soon as possible at the scene of the accident or incident. Accident reports will consist of completion of Motor Pool issued accident forms. An incident will cover all things which may occur which are not categorized as vehicular accidents and to include delays enroute. The incident report will consist of a brief but concise written narrative covering "What Happened", "Where It Happened", "When It Happened", and "What Persons or Objects Were Involved".

5. PROCEDURES IN CASE OF THEFT OR LOSS.

a. Notify the Health Physics Officer, WRAMC (Telephone: 576-5161) who in turn will notify the Military Police.

b. Attempt to recover in case of loss.

SPECIAL INSTRUCTIONS FOR DRIVERS

DATE.

TO: *(Carrier's Name and Trailer Number)*

FROM: *(Station Issuing Instructions)*

BILL OF LADING NUMBER

THIS TRUCK IS LOADED WITH *(commodity description)*

PLACARDS *(specified by I.C.C. reg)*

GENERAL PRECAUTIONS

1. Protect the public from the hazards of the cargo.
2. Do not allow smoking or the use of matches or lighters in or near the vehicle.
3. Obey all state and local traffic regulations.
4. Do not exceed posted speed limits.
5. While operating over public roads keep at least 300 feet from trucks loaded with explosives or other dangerous articles.
6. Stop at all railroad crossings.
7. Use designated routes; wherever possible avoid congested residential or business areas.
8. Do not permit unauthorized persons to ride in/on vehicles.
9. At other than carrier rest stops or interchange points, select safe parking space at stopping locations designated by the carrier. Vehicles carrying explosives should not group together at these stopping locations.
10. Deliver shipment to receiving installation during normal working hours and only to persons authorized to accept it.

IN CASE OF BREAKDOWN

1. Do not tow loaded vehicle.
2. Post flags by day, and red electric lanterns or reflectors by night to warn traffic approaching from each direction.

IN CASE OF FIRE

1. If any part of the truck, excluding contents, catches fire, take truck to a clear or uninhabited area, if practicable, and/or attempt to put fire out immediately with hand extinguishers.
2. If fire reaches contents of truck or gets out of control, warn nearby persons and request notification of police and fire departments.
3. If in convoy, other trucks proceed to safe distance.
4. You can use water to fight this cargo fire.
5. Firemen should not approach closer than _____* feet from fire.
6. Persons should not approach closer than _____* feet from truck.
7. Fire fighting apparatus should be kept at least _____* feet or operating distance from fire.
8. As soon as practical notify the nearest military installation for instructions.

IN CASE OF ACCIDENT

1. Set brake and block vehicle to prevent movement.
2. Post flags by day, and red electric lanterns or reflectors by night to warn traffic approaching from each direction.
3. Call for ambulance, if necessary.
4. Notify nearest police.

NOTIFY *(by phone or wire as soon as possible)*

OTHER SPECIFIC PRECAUTIONS

These instructions must be transferred to each subsequent driver for turn-in at final destination. If more than 3 drivers are involved the additional signatures should be made on an extra sheet and attached hereto.

SIGNATURE OF SHIPPER REPRESENTATIVE

SIGNATURE OF FIRST DRIVER

SIGNATURE OF SECOND DRIVER

SIGNATURE OF THIRD DRIVER

* *The distances shown are minimums; greater distances should be used whenever possible.*

DD FORM 1 MAR 64 836

PREVIOUS EDITIONS OF THIS FORM ARE OBSOLETE.

MOTOR VEHICLE INSPECTION (TRANSPORTING HAZARDOUS MATERIAL)	DATE	HOUR	REPORT CONTROL SYMBOL
	REPORTING INSTALLATION		CHECK ONE ☐ ORIGIN ☐ DESTINATION
NAME OF CARRIER	SHIPMENT RECEIVED FROM		ENTERING ☐ EMPTY ☐ LOADED
NAME OF DRIVER	DRIVER'S STATE PERMIT NO.	GBL NO.	DOCTOR'S CERTIFICATE DATED:

VEHICLE

TYPE OF VEHICLE	TRUCK LICENSE NUMBER	TRAILER(S) NUMBER	SLEEPER CAB
☐ TRUCK ☐ TRUCK AND FULL TRAILER ☐ TRACTOR AND DOUBLE TRAILERS ☐ TRACTOR AND CLOSED SEMI-TRAILER ☐ TRACTOR AND FLAT-BED TRAILER	I.C.C. NUMBER	LICENSE(S) NUMBER	☐ YES ☐ NO VALID LEASE ☐ YES ☐ NO

NOTE: All of the following items shall be checked on empty equipment prior to loading. Items with an asterisk (*) shall be checked on incoming loaded equipment.

ITEM NO.	CHECK APPROPRIATE COLUMN (See reverse side for explanatory notes)	SATISFACTORY	UNSATISFACTORY	REMARKS (Explain unsatisfactory items; use reverse side if necessary.)
1	ENGINE, BODY, CAB AND CHASSIS CLEAN			
2	STEERING MECHANISM			
3	HORN OPERATIVE			
4	WINDSHIELD AND WIPERS			
5	SPARE ELECT. FUSES AVAILABLE			
6	REAR VIEW MIRRORS INSTALLED			
7	HIGHWAY WARNING EQUIPMENT			
*8	FULL FIRE EXTINGUISHERS (2) INSTALLED			
9	LIGHTS AND REFLECTORS OPERATIVE			
10	EXHAUST SYSTEM			
*11	FUEL USED (LP Gas Prohibited)			
*12	FUEL TANK, LINE AND INLET			
13	COUPLING DEVICES – KINGPIN LOCK			
*14	ALL BRAKES OPERATIVE			
*15	LANDING GEAR ASSEMBLY OPERATIVE			
16	SPRINGS AND ASSOCIATED PARTS			
*17	TIRES			
18	CARGO SPACE			
*19	ELECTRIC WIRING			
*20	TAIL GATE AND DOORS SECURED			
*21	FIRE AND WATER RESISTANT TARPAULIN			
22	ANY OTHER DEFECTS (Specify)			

☐ APPROVED (If rejected give reasons on reverse side, under "Remarks." Equipment shall be approved if deficiencies are corrected prior to loading.)
☐ REJECTED

SIGNATURE (of Inspector)

	ITEMS TO BE CHECKED PRIOR TO RELEASE OF LOADED VEHICLE	CHEC
23	MIXTURES OF MATERIAL PROHIBITED BY DOT REGS. ARE NOT LOADED ONTO THIS VEHICLE	
24	LOAD IS SECURED TO PREVENT MOVEMENT	
25	WEIGHT IS PROPERLY DISTRIBUTED AND VEHICLE IS NOT OVERLOADED	
26	SEAL(S) APPLIED TO CLOSED VEHICLE. FIRE AND WATER RESISTANT TARPAULIN APPLIED ON OPEN VEHICLE	
*27	SPECIAL INSTRUCTIONS (DD Form 836) RECEIVED BY DRIVER	
*28	COPY OF VEHICLE INSPECTION (DD Form 626) FURNISHED DRIVER	
*29	PROPER PLACARDS APPLIED	
*30	SHIPMENT MADE UNDER DOT SPECIAL PERMIT NUMBER 888	

SIGNATURE (of Inspector)	SIGNATURE (of Driver)

DD FORM 1 SEP 68 626 REPLACES EDITION OF 1 JAN 67, WHICH IS OBSOLETE.

ANNEX N (RADIOACTIVE WASTE)
to WR 40-10 (Health Physics Regulations)

1. PURPOSE. To prescribe the policies and procedures to be followed in the management of radioactive waste at WRAMC in order to insure compliance with pertinent laws and regulations.

2. RESPONSIBILITIES.

a. The Health Physics Officer is responsible for the management and control of radioactive waste to include effluents released to the unrestricted environment.

b. Principal Users are responsible for segregation, packaging and delivery of radioactive wastes generated under their control to the areas designated by the Health Physics Officer.

c. Individual users are responsible for:

(1) Keeping the inventory of radioactive waste in their possession to a practical minimum.

(2) Providing containers for their radioactive waste.

(3) Properly identifying the contents of their waste, to include radioisotope, approximate activity, date, and Authorization number in the manner prescribed by Health Physics.

3. POLICIES AND PROCEDURES.

a. Radioactive waste is excess or surplus unwanted radioactive material and material contaminated with radioisotopes, including sources and special waste, and property which, while originally non-radioactive, has become contaminated to such an extent that it is economically unsound to decontaminate, or the contamination cannot be reduced to an acceptable level for its intended use.

b. Radioactive waste must be classified and segregated into the following classes:

(1) Solid, combustible.

(2) Solid, non-combustible.

(3) Liquid, combustible.

(4) Liquid, non-combustible.

(5) Gas, combustible.

(6) Gas, non-combustible.

(7) Animal carcasses and/or animal waste.

c. Procedures to be followed by users of radioactive material include:

(1) Segregation of radioactive waste into the above categories.

(2) Limit the non-radioactive waste which is intermixed with the radioactive waste to a practical minimum.

(3) Solid waste shall be placed in magenta plastic bags or a receptacle lined with a magenta plastic bag. The bag, when filled and delivered for disposal, will be taped closed. If plastic bags are used for radioactive waste containing Tritium, they will be placed inside a kraft paper bag.

(4) Liquid waste that is retained for disposal should be collected in plastic bottles or sealed cans to diminish the breakage hazard. However, liquid waste that will chemically react with plastic and liquid waste containing Tritium should be placed in glass bottles. All bottle caps should be taped when presented for disposal.

(5) All radioactive waste containers shall be properly marked with the radiation caution symbol and the words "Caution - Radioactive Waste" and/or "Caution - Radioactive Material."

(6) The inventory of radioactive waste in the possession of individual users will be kept to a practical minimum.

(7) Radioactive waste will be controlled by the user to prevent unauthorized disposal by the custodial service. Maximum use of the magenta plastic bags for radioactive waste is encouraged.

(8) Animal carcasses will be packed in two plastic bags of suitable size and strength and kept frozen until ~~picked up~~ DELIVERED to by Health Physics. C-1

d. Disposal of Radioactive Waste.

(1) Radioactive waste will be collected by the user and disposed of in accordance with instructions received from Health Physics.

(2) Excreta from patients undergoing medical diagnosis or therapy

may be disposed of in the usual manner, providing the toilet is operated twice each time excreta is released during the first 48 hours after administration of therapeutic doses of unsealed radioisotopes. This procedure is necessary to insure complete removal of the material from the ward plumbing, and adequate dilution of the material.

(3) Radioactive material will not be disposed of by incineration or burial in the soil at WRAMC.

(4) Radioactive materials will not be released from holding tanks into the sanitary sewage system without the specific approval of the Health Physics Officer, except as provided in para 3d(2), above.

(5) Individual users may be permitted to dispose of radioactive waste via laboratory sinks into the sanitary sewage system under the following conditions:

(a) The user obtains permission from the Health Physics Officer.

(b) The sink through which the material is discharged is conspicuously posted with a sign bearing the Radiation Caution symbol and the words "Caution - Radioactive Material Disposal Sink."

(c) The sink is posted with a notice to the user that the radioactive material discharged through the sink must be readily soluble or dispersible in water and does not contain any substances which are hazardous to health or will result in substantial harm to domestic animals, fish, shellfish, or wildlife.

(d) A record of the identity and activity of material discharged through the sink is maintained by the user.

(e) The material is essentially neutral, i.e., pH of 6 - 8.

(f) The quantity of any material released by the user in any one day does not exceed ten (10) times the amount specified in the APPENDIX to ANNEX W of these Regulations. Alternate limits prescribed in 10 CFR 20.303 may be employed only with prior approval of the Health Physics Officer, such approval to be valid only for that specific release.

(e) Ultimate disposal of radioactive waste will be accomplished by the Health Physics Officer in accordance with AR 755-15 and other pertinent directives.

APPENDIX (RADIOACTIVE WASTE DISPOSAL SINK DUMP LIMITS)
to ANNEX N (RADIOACTIVE WASTE)

THE RADIOACTIVE MATERIAL DISCHARGED THROUGH THIS SINK MUST BE READILY SOLUBLE OR DISPERSIBLE IN WATER. THE QUANTITIES OF THE COMMONLY-USED RADIONUCLIDES DISCHARGED THROUGH THIS SINK IN ANY ONE DAY MUST NOT EXCEED TEN (10) TIMES THE AMOUNT SPECIFIED BELOW (For isotopes not listed, call Ext. 3481 for limits).

Material	Microcuries
Antimony-124	10.00
Arsenic-74	10.00
Barium-133	10.00
Barium-140	10.00
Bismuth-210	1.00
Bromine-82	10.00
Cadmium-109	10.00
Cadmium-115	100.00
Calcium-45	10.00
Calcium-47	10.00
Carbon-14	100.00
Cerium-141	100.00
Cerium-144	1.00
Cesium-131	1000.00
Cesium-137	10.00
Chlorine-36	10.00
Chromium-51	1000.00
Cobalt-58	10.00
Cobalt-60	1.00
Copper-64	100.00
Fluorine-18	1000.00
Gold-198	100.00
Hydrogen-3	1000.00
Indium-113m	100.00
Iodine-125	1.00
Iodine-129	0.10
Iodine-131	1.00
Iridium-192	10.00
Iron-55	100.00
Iron-59	10.00
Krypton-85	100.00
Manganese-54	10.00
Manganese-56	10.00
Mercury-197	100.00
Mercury-203	10.00
Molybdenum-99	100.00
Nickel-63	10.00
Phosphorous-32	10.00
Potassium-42	10.00
Radium-226	0.01
Rubidium-86	10.00
Selenium-75	10.00
Sodium-24	10.00
Strontium-85	10.00
Strontium-89	1.00
Strontium-90	0.10
Sulphur-35	100.00
Tantalum-182	10.00
Technetium-99m	100.00
Technetium-99	10.00
Thallium-204	10.00
Thorium (natural)	50.00
Tin-113	10.00
Uranium (natural)	50.00
Xenon-133	100.00
Zinc-65	10.00
Zinc-69m	100.00
Zirconium-95	10.00

ANNEX O (LEAK TESTING SEALED SOURCES)
to WR 40-10 (Health Physics Regulations)

1. PURPOSE. To delineate responsibilities for leak testing of sealed sources of radioactive material at WRAMC.

2. DEFINITIONS.

a. Sealed Sources, for the purpose of this ANNEX, are those which meet all of the following criteria:

(1) Radioactive material, other than Tritium.

(2) Half-life greater than thirty (30) days.

(3) In any physical form other than gas.

(4) In a quantity which is greater than 100 microcuries of beta and/or gamma-emitting material or greater than 10 microcuries of alpha-emitting material.

(5) Inclosed in, and is intended to be used in, a container of durable (not fragile) material in a manner intended to prevent leakage or escape of the radioactive material or any of its daughter products.

b. Leak Test. A nondestructive test in which a sample is taken from the sealed source or from the surfaces of the device in which the sealed source is permanently or semi-permanently mounted or stored, on which one might expect contamination to accumulate. Leak tests may be taken by any of a variety of techniques depending on the source, the radioisotope, the method of analysis, the mounting, etc.

3. RESPONSIBILITY. The Health Physics Officer is responsible for performance, analysis, and posting of records of all leak tests performed at WRAMC to satisfy the requirements of AR 700-52, USAEC License conditions, and DA Authorizations for the Use of Radioisotopes.

4. CRITERIA FOR LEAK TESTING.

a. Leak tests, when required, will be performed at intervals not to exceed six (6) months, except that each source of alpha-emitting radioisotope will be tested at intervals not to exceed three (3) months.

b. If a source requiring leak testing is supplied with a certificate from the vendor indicating that a leak test has been made within six (6) months (three (3) months for alpha-emitting sources), the source need not

be retested until six (6) months (three (3) months for alpha-emitting sources) from the date of the last test and may be issued for immediate use.

c. If no documentary evidence is available to substantiate that a given source has been leak tested within six (6) months (three (3) months for alpha-emitting sources), the source will not be issued until it has been leak tested and the results evaluated.

d. The leak test shall be capable of detecting the presence of 0.005 microcuries of radioactive material on the test sample.

e. Sealed sources will be considered contaminated if a leak test removed 0.005 microcuries of radioactive material of an identifiable quantity of the radioisotope contained within the capsule.

f. All sealed sources found to be contaminated will be immediately withdrawn from use by the Health Physics Officer, who will determine whether or not the source is leaking. If it is leaking, he shall direct that it be resealed or disposed of. He shall also render any required reports.

g. The Health Physics Officer shall be notified prior to fabrication of a sealed source so that the required leak testing may be accomplished.

ANNEX P (SURVEY OF WORKING AREAS)
to WR 40-10 (Health Physics Regulations)

1. PURPOSE. The purpose of this ANNEX is to delineate the responsibilities for survey of working areas where radioactive materials are used.

2. RESPONSIBILITIES.

a. Health Physics will perform a formal radiation protection survey in each area where radioactive material is located at least once each month ~~and will provide a written report of the survey to the Principal User.~~ C-1

b. Each Principal User is responsible for radiological safety within his work area. He will cause such readings and evaluations to be made as part of routine procedures as are necessary to insure that unwarranted radiological hazards are not present. Health Physics will, upon request, advise on appropriate procedures and, in some instances, provide necessary survey instrumentation.

c. Health Physics will provide additional coverage to users of radioactive materials, radiation producing devices, lasers, and microwave generators consistent with their requirements and will, upon request, perform additional studies and evaluations.

3. AREAS OF INTEREST. Radiological protection surveys will include evaluations of the following areas, as appropriate;

a. Surface contamination, both removable and fixed.

b. Dose-rate measurements.

c. Airborne radiological hazard, both particulate and gaseous.

d. Ventilation, including fume hoods.

e. Storage areas for radioactive materials.

f. Radioactive waste management, including radioactive waste disposal sinks.

g. Fire and safety hazards.

h. Radiation safety and contamination control aspects of the working environment and experimental procedures.

i. The familiarity of personnel with radiological safety and emergency procedures.

WR 40-10, C-1 17 June 1974

ANNEX Q (MACHINE-PRODUCED RADIATION)
to WR 40-10 (Health Physics Regulations)

1. All machines and devices which produce X-Ray, laser or microwave radiation will be registered with the Health Physics Officer, who will maintain the required registry of such devices in accordance with AR 700-52 and other pertinent directives.

2. All proposed procurements, installations, modifications to installations, and relocations of X-ray, laser, and microwave devices will be coordinated with Health Physics. An evaluation will be made of the planned use of the equipment, its location, and protective barriers, interlocks, etc., prior to final approval to insure the adequacy of the facility prior to commitment of funds.

3. Design or modification of installations shall be accomplished in accordance with:

a. For X-Ray: TB MED 62, and the recommendations given in NCRP Reports 33 through 36 and NBS Handbook 93 (Non-Medical X-Ray Protection).

b. For Laser: TB MED 279 (Control of Hazards to Health from Laser Radiation) and AR 40-46.

c. For Microwave: TB MED 270 (Control of Hazards to Health from Microwave Radiation), and AR 40-44.

d. For Accelerator: NBS Handbook 107 (Radiological Safety in Design and Operation of Particle Accelerators).

4. Persons having responsibility for these radiation sources will notify the Health Physics Officer of their receipt prior to putting them into use.

5. Health Physics will conduct a radiation protection survey of all new, modified, or repaired X-ray, laser, or microwave installations prior to their routine use. A radiation protection survey is defined as the evaluation of the radiation hazards in and around an installation. It customarily includes a physical survey of the arrangement and use of the equipment and measurements of the exposure rates under expected operating conditions. A full radiation protection survey is not required following repairs if there is no possibility that the output, alignment, shielding, or safety aspects of the equipment have been altered by the repairs.

6. Health Physics will conduct a radiation protection survey of existing installations upon request, or at the discretion of the Health Physics Officer, to ascertain that equipment, structural shielding, safety devices, and operating procedures are in accordance with pertinent directives, standards, and guides.

7. A written report of the results of the survey will be furnished to the person responsible for the installation.

8. Whenever an X-Ray, laser, or microwave device or its installation is found to exceed the limits of the appropriate safety standard, or is otherwise potentially hazardous to personnel, the Health Physics Officer will recommend suitable corrective action, and will determine if the equipment can continue to be operated pending repairs, modifications, etc., without jeopardizing the health and well-being of patients and/or occupationally exposed personnel. The responsible individual will be advised, in writing, of these recommendations so that appropriate action may be taken.

9. It is the responsibility of the person in charge of the installation to assure that all equipment under his jurisdiction is operated by persons competent in its safe use. When necessary, he will develop an SOP governing the use of the equipment and post it prominently to insure compliance with his instructions.

10. The person in charge of the installation is responsible for the proper education of personnel in safe operating procedures and the nature of injuries resulting from overexposure. He should promulgate rules for working safety, including any restrictions in operating techniques required, to assure safe utilization of equipment.

11. All persons entering an X-ray, laser, or microwave area shall comply with all safety instructions which concern or affect their conduct and shall use such safety devices as are furnished for their protection.

APPENDIX 1 (GENERAL SAFETY PRECAUTIONS FOR LASER OPERATIONS)
to ANNEX Q (MACHINE-PRODUCED RADIATION)

1. PURPOSE. To provide guidelines for the safe operation of laser devices at Walter Reed Army Medical Center.

2. GENERAL. The effects of laser radiation are essentially the same as light generated by more conventional ultraviolet, infrared, and visible light sources. The unique biological implications attributed to laser radiation are generally those resulting from the very high intensities and monochromaticity of laser light. The principal biological hazards are to the eyes and, to a lesser degree, to the skin. Susceptibility to injury and the severity of injury are dependent upon various properties and the power density of the laser light.

3. HAZARD EVALUATION.

a. General Procedure. Three aspects of a laser application influence the total hazard evaluation and thereby influence the application of control measures:

(1) The laser device's capability of injuring personnel.

(2) The environment in which the laser is used.

(3) The personnel who may be exposed.

A practicle means for both evaluation and control of laser radiation hazards is to first cassify laser devices according to their relative hazards and then to specify appropriate controls for each classification. The use of the classification method will in most cases preclude any requirements for laser measurements and greatly reduce the need for calculations. This standardized laser classification scheme defines aspect 1- the potential hazard of the laser device. Aspects 2 and 3 vary with each laser application scheme. The total hazard evaluation procedure must consider all three aspects, although in most cases only aspect 1 influences the control measures which are applicable.

b. Laser and Laser System Hazard Classification Scheme.

(1) The general classification scheme with general hazard control concepts is as follows:

(a) Class 1 - Exempt (EL) laser devices are those not capable of emitting hazardous laser radiation under any operating or viewing conditions.

(b) Class II - Low power (LP) laser devices are those CW visible (400-700 nm) laser devices having a total power between 0.4 μW and 1 mW. Precautions are required only to prevent continuous staring into the direct beam; momentary (<0.25 sec) exposure as would occur in an unintentional viewing situation is not considered hazardous.

(c) Class III - Medium power (MP) laser devices are potentially hazardous if the direct beam is viewed by the unprotected eye, but do not (unless focused) cause hazardous diffuse reflections. Care is required to prevent intrabeam viewing and control specular reflections. Most military laser rangefinders and designators fall into this category.

(d) Class IV - High power (HP) lasers are those pulsed visible lasers capable of producing hazardous diffuse reflections or fire and skin hazards, or those CW lasers with an output above 0.5 W. Safety precautions associated with high power lasers generally consist of using door interlocks to prevent exposure to unauthorized or transient personnel entering the laser facility, the use of baffles to terminate the primary and secondary beams, and the wearing of protective eyewear and clothing by personnel.

(e) Class V - Enclosed Laser (ES) - As the name implies, the laser is enclosed such that potentially hazardous optical radiation does not exit from the enclosure.

(2) This classification scheme is identical to that used in American National Standards Institute "ANSI-Z-136, Safe Use of Lasers, 1973." This classification may already appear on commercial laser products manufactured subsequent to the adoption of that standard and should be used unless the laser is modified to significantly change its output power or energy, or unless the laser is enclosed.

4. SAFEGUARDS AND LIMITATIONS.

a. Medical examinations will be performed on personnel who work with lasers in accordance with ANNEX F to these Regulations.

b. Visitors to a laser installation who are adequately protected from the laser beam by laser goggles or other suitable means need not be included in the surveillance program.

c. Significant or unexplained changes in the ocular examination will be reported to the Health Physics Officer, WRAMC, for investigation in coordination with the Ophthalmology Service, WRAMC.

d. Any individual having or suspected that there has been an accident involving exposure to laser radiation will report the accident to the Health Physics Officer as soon as possible (Ext. 5107 or 5161).

e. Signs warning of hazardous laser radiation will be posted at all entrances to such areas. These signs are available from Health Physics, WRAMC.

f. Only trained personnel will operate laser devices.

g. Each section using laser devices will maintain SOP's for the operation of each type of laser device used within the section. These SOP's will be approved by Health Physics.

h. Laser installations will be inspected periodically by Health Physics.

ANNEX R (HEALTH PHYSICS ASPECTS OF PATIENT CARE)
to WR 40-10 (Health Physics Regulations)

1. RESPONSIBILITIES.

a. The Health Physics Officer, WRAMC, is responsible for providing full-range Health Physics support throughout WRAMC.

b. The Commander, WRAMC, provides such guidelines as are necessary to insure adequate protection for medical treatment personnel involved in patient care who are occupationally exposed to ionizing radiation.

2. SPECIFIC REQUIREMENTS.

a. Individuals who are occupationally exposed to radiation from radioisotopes or X-ray producing devices will wear film badges unless specifically exempted therefrom by the Health Physics Officer.

b. Personnel, equipment, linen and facilities will be monitored for radioactive contamination following any procedure in which the possibility of contamination exists.

c. Dressings, etc., destined for disposal will be monitored and disposed of as radioactive waste when warranted.

d. Health Physics personnel will not impede patient care, but are expected to make recommendations to minimize the accumulated dose to medical personnel and patients who are not being treated with radiation.

e. Patients will not normally be discharged from the hospital with more than ~~30~~ 80 mCi of radioactive material remaining in the body. The specific requirements of USAEC License 08-01738-02 are given in para 7, APPENDIX 5 to this ANNEX. C-1

f. Guidance on various areas of patient care are described below:

(1) Health Physics Aspects of Nursing Care of Radiation Therapy Patients with SEALED Sources (See APPENDIX 1 to this ANNEX).

(2) Health Physics Aspects of Nursing Care of Radiation Therapy Patients with NON-SEALED Sources (See APPENDIX 2 to this ANNEX).

(3) Death - Health Physics Procedures (See APPENDIX 3 to this ANNEX).

(4) Health Physics Aspects of Surgery and Autopsy (See APPENDIX 4 to this ANNEX).

(5) Health Physics in the Therapeutic Administration of Radioactive Material (See APPENDIX 5 to this ANNEX).

(6) Management of Radioactive Casualties (See ANNEX S to these Regulations).

APPENDIX 1 (HEALTH PHYSICS ASPECTS OF NURSING CARE OF RADIATION THERAPY PATIENTS WITH SEALED SOURCES)
to ANNEX R (HEALTH PHYSICS ASPECTS OF PATIENT CARE)

1. PURPOSE. The purpose of this APPENDIX is to familiarize the nursing staff with their responsibilities to the patient and themselves in the prevention of unnecessary exposure to radiation.

2. GENERAL.

a. This type of radioactive source is encapsulated in a metal tube which is then sealed and therefore is classified as a sealed source. Once this source has been removed from the patient, there is no longer a source of radiation in the patient. Normally, there is no contamination on the linen, utensils, etc.

b. If any of the following should occur, notify Health Physics (Ext. 3575/5107) AND the physician who administered the radioactive material:

(1) Major surgery.

(2) Transfer of the patient.

(3) Death of the patient.

3. SPECIFIC GUIDANCE.

a. Whenever possible, place the patient in a private room with the bed near the outside wall of the room. When it is necessary, two radiation therapy patients may be placed in the same room. A non-radiation therapy patient should not be in the same room with a radiation therapy patient.

b. Consistent with adequate care for the patient, carry out only minimal nursing procedures close to the patient. If the patient's clinical status requires constant observation, rotate personnel required to perform adequate nursing care in order to minimize exposure to personnel. The patient's bed should be approached only when required by nursing duties.

c. Wear YOUR film badge when entering the area. DO NOT use the film badge issued to another employee. Film badges may be obtained by calling Health Physics (Ext. 3575/5107).

d. Personnel are not to remain in the room unless engaged in a specific activity. Custodial, utility, maintenance, and food service workers

should not enter the room unless they receive permission and instructions from the ward nurse.

e. A television set, telephone, books, etc., may be provided for the patient.

f. Excreta, linens, and other equipment may be handled in the usual manner.

g. Special handling of the food tray is not required.

h. In the event of a suspected loss or dislodgment of the sealed source:

(1) Notify the physician who administered the source.

(2) Notify Health Physics (Ext. 3575/5107).

(3) Do not remove any containers or linen from the room, flush the toilet, or use the sink.

(4) The radioactive source must be handled only with forceps.

i. Health Physics will monitor the patient area and will indicate a "safe distance" line for visitors.

j. The patient may have visitors. Except for the greeting, the visitors should stay on the "safe" side of the line indicated on the floor.

k. If the patient should die, notify the physician who administered the source. The source will be removed before the body is taken to the morgue.

APPENDIX 2 (HEALTH PHYSICS ASPECTS OF NURSING CARE OF RADIATION THERAPY PATIENTS WITH NON-SEALED SOURCES)
to ANNEX R (HEALTH PHYSICS ASPECTS OF PATIENT CARE)

1. PURPOSE. The purpose of this APPENDIX is to familiarize the nursing staff with their responsibility to the patient and themselves in the prevention of unnecessary exposure to radiation.

2. GENERAL.

a. This type of radioactive source is usually administered in liquid form and therefore is classified as a non-sealed source. The source material will remain in the patient until it decays by half-life and/or is excreted; therefore, contamination of linen, etc., is possible.

b. Notify Health Physics (Ext. 3575/5107) AND the physician who administered the radioactive material if any of the following occur:

(1) Major surgery.

(2) Transfer of the patient.

(3) Death of the patient.

3. SPECIFIC GUIDANCE.

a. Whenever possible, place the patient in a private room with the bed near the outside wall of the room. When necessary, two radiation therapy patients may be placed in the same room. A non-radiation therapy patient should not be in the same room with a radiation therapy patient.

b. Consistent with adequate care for the patient, carry out only minimal nursing procedures close to the patient. If the patient's clinical status requires constant observation, rotate personnel required to perform adequate nursing care in order to minimize exposure to personnel. The patient's bed should be approached only when required by nursing duties.

c. Wear YOUR film badge when entering the area. DO NOT use the film badge of another employee. Film badges may be obtained by calling Health Physics (Ext. 3575/5107).

d. Personnel are not to remain in the room unless engaged in a specific activity. Custodial, utility, maintenance, and food service personnel should not enter the room unless they receive permission and instructions from the ward nurse.

e. A television set, telephone, books, etc., may be provided the patient.

f. The food tray will be prepared entirely with disposable components. The tray will be disposed of as waste within the patient's room. Uneaten food WILL NOT be given to other patients or staff members.

g. Health Physics will monitor the patient area and will indicate a "safe distance" line for visitors.

h. The patient may have visitors. Visitors should stay on the "safe" side of the line indicated on the floor.

i. Necessary contamination control measures are very similar to isolation techniques.

j. Cover the mattress and pillow on the bed with plastic or rubber material.

k. Wear gloves when changing bed linen, dressings, etc.

l. The patient must wear hospital pajamas.

m. Place a plastic-lined waste basket and linen hamper in the patient's room.

n. Place waste, soiled linen, etc., in the designated containers for monitoring and disposal by Health Physics personnel.

o. Personal items for patient care (thermometer, bedpan, etc.) will be kept in the patient's room. Bath water may be disposed of in the commode.

p. Ambulatory patients will use the commode in THEIR room.

q. Diagnostic samples of blood, urine, and feces should only be obtained when authorized by the radiotherapist.

r. The urine excreted by the patient is radioactive. Spills, bedwetting, or any accident with urine are radiation hazards. Wear gloves. In the event of an accidental spill of urine, cover it with absorbent material, then place the material in the designated waste container. Notify Health Physics immediately.

s. Call the Post Engineer AND the Health Physics Officer for correction of plumbing problems. Blocked drains may be a radiation hazard.

t. If the patient dies, notify the physician who administered the source AND Health Physics. The body will not be removed from the ward until a Health Physicist advises on the appropriate protective measures to be taken during transport of the remains.

u. The room will not be returned to general use (i.e., another patient placed in the room) until cleared by Health Physics.

APPENDIX 3 (DEATH - HEALTH PHYSICS PROCEDURES)
to ANNEX R (HEALTH PHYSICS ASPECTS OF PATIENT CARE)

1. APPLICABILITY. This APPENDIX applies to the management of remains of patients who have been undergoing radiation therapy with radioactive implants or unsealed radioisotopes. If the residual quantity within the body is less than 5 mCi (i.e., if there is no Health Physics Instruction Card in the patient's Kardex File), the body will be handled without regard for the presence of the radioactive material.

2. RADIOACTIVE IMPLANTS. When the patient has been treated with a radioactive implant, the procedure outlined below will be followed:

a. Notify the radiotherapist who administered the implant. The implant will be removed before the remains are taken to the morgue.

b. Notify Health Physics (Ext. 3575/5107) for any special instructions in management and transportation of the remains and return of the room to general use.

c. After the radioactive implant has been removed from the body, the remains may be handled in the routine manner.

d. If the radioactive implant cannot be removed from the body (e.g., radon seeds, gold seeds, etc.), process the remains as outlined in para 4, below.

3. UNSEALED RADIOISOTOPES. When the patient has been receiving radiation therapy using unsealed radioactive material (radioisotopes), the procedure outlined below will be followed:

a. Notify the radiotherapist who administered the radioactive material.

b. Notify Health Physics (Ext. 3575/5107). A Health Physics Technician will report to the ward to assist in:

(1) Management of the remains.

(2) Transportation of the remains to the morgue.

(3) Survey of the room, personal effects, linen, etc., for radioactive contamination and clear them for return to general use.

(4) Removal of any radioactive waste or items for disposal or decontamination, as appropriate.

(5) Removal of protective markings and signs from the patient's room.

4. ADMINISTRATIVE REQUIREMENTS. To insure the prompt identification of radioactive remains and to facilitate the minimizing of radiation exposure of the staff, the following administrative procedures will be followed.

a. The "CAUTION - RADIOACTIVE MATERIALS" label affixed to the outside of the chart will remain in place until all radioactive material is removed from the body.

b. The tag located in the Kardex File bearing the radiation warning symbol and the words, "CAUTION - RADIOACTIVE MATERIALS. This patient's body contains a significant quantity of radioactive material as specified in Chapter 3, NCRP Report Number 37", will be attached to the body in the same manner as the tag contained in the mortuary pack.

c. A similar tag or label will be attached to the outside of the shroud by the attending Health Physics Technician.

d. If the body contains residual quantities of radioactive material, the Health Physics Officer or his representative will complete and sign one of the following statements in accordance with Appendix V, NCRP Report Number 37. This statement will be attached to the Death Certificate for transmittal to the Funeral Director by the Registrar, WRAMC.

(1) REPORT ON RADIOACTIVITY

TO: Funeral Director

FROM: Health Physics Officer
Walter Reed Army Medical Center
Washington, D. C. 20012

This body contains no significant amount of radioactive material. No special precautions are required if only standard embalming procedures are employed.

HEALTH PHYSICS OFFICER
Walter Reed Army Medical Center
DATE: _____

(2) REPORT ON RADIOACTIVITY

TO: Funeral Director

FROM: Health Physics Officer
Walter Reed Army Medical Center
Washington, D. C. 20012

This body contains a significant amount of radioactive material. The following special precautions are recommended:

_____

_____

_____

HEALTH PHYSICS OFFICER
Walter Reed Army Medical Center
DATE: _____

6. REFERENCES.

a. NCRP Report Number 37, Precautions in the Management of Patients Who Have Received Therapeutic Amounts of Radionuclides.

b. Quimby, E. N., and Feitelberg, S., Radioactive Isotopes in Medicine and Biology, Lea and Debiger, Philadelphia, 1963.

APPENDIX 4 (HEALTH PHYSICS ASPECTS OF SURGERY AND AUTOPSY)
to ANNEX R (HEALTH PHYSICS ASPECTS OF PATIENT CARE)

1. GENERAL.

a. Health Physics will provide direct support (consisting of at least one (1) technician) to surgery and autopsy on patients whose bodies contain radioisotopes.

b. The principal guidance for surgeons, pathologists, and funeral directors on this subject is contained in NCRP Report No. 37, a copy of which will be provided by Health Physics upon request.

c. Health Physics support and/or advice regarding radiation protection during surgery or autopsy may be obtained by calling:

Duty hours: Ext. 3575, 2276, 3481, and 5107.
After duty hours: Ext. 5107.

2. SPECIAL REQUIREMENTS.

a. Prior to the surgery (autopsy) the physician who administered the radioactive material should meet with the assigned surgeon (pathologist) and the Health Physics Officer. The probable residual quantity of radioactive material within the body will be estimated. The Health Physics aspects of the surgery (autopsy) procedure will be ~~estimated~~. EVALUATED. C-1

b. If the anticipated exposure to the surgeon (prosector) and his assistants is considered to be prohibitive, it may be necessary to delay the procedure to allow for a "cooling off" of the radioactive material in the body, or rotate the personnel performing the procedure to preclude overexposure.

c. Personnel engaged in and supporting surgery (autopsy) will wear film badges if the patient contains radioisotopes, unless exempted by the Health Physics Officer.

d. Personnel, equipment, linen, and facilities will be monitored for radioactive contamination following the procedure when the possibility of contamination exists.

e. Tissues, dressings, etc., destined for disposal will be monitored and disposed of as radioactive waste, when warranted.

f. Health Physics personnel will not impede procedures, but are

expected to make recommendations to minimize the accumulated dose to the surgeon (pathologist) and other members of the team.

g. Autopsy.

(1) At the completion of the autopsy, the physician who administered the radioactive material will inform the Health Physics Officer of the probable residual quantity of radioactive material within the body, based on the body fluids, tissues, and organs which were removed.

(2) The Health Physics Officer will review the statement which has been executed for delivery to the Funeral Director to determine if the warning is still applicable.

APPENDIX 5 (HEALTH PHYSICS IN THE THERAPEUTIC ADMINISTRATION OF RADIOACTIVE MATERIAL)
to ANNEX R (HEALTH PHYSICS ASPECTS OF PATIENT CARE)

1. PURPOSE. The purpose of this ANNEX is to specify the duties of the Health Physics Technician in the prevention of unwarranted exposure to nursing personnel, visitors, and those who occupy areas adjacent to the patient being treated.

2. NOTIFICATION OF THERAPEUTIC ADMINISTRATION.

a. Sealed Sources.

(1) The radiotherapist will forward to the Health Physics Technician the type and quantity of sealed sources, the applicator to be used and its loading arrangement, the patient's name, date of use, and ward number.

(2) The radiotherapist will load the applicator and record the pertinent data in the log book in the storage room.

b. Non-Sealed Sources. The Nuclear Medicine Clinic will notify the Health Physics Technician by telephone of the proposed schedule for the administration of the radioactive material.

c. Notification of Ward Nurse.

(1) The Health Physics Technician will notify the appropriate ward nurse of the proposed administration of radioactive material. A copy of APPENDIX 1 or 2 to ANNEX R will be furnished to the ward as appropriate.

(2) The Health Physics Technician will obtain from the nurse the names and social security numbers of those persons who will be caring for the therapy patient and will issue film badges to them.

(3) WRAMC Form 426, "Radiation Therapy Monitoring Record", will be initiated in duplicate by the Health Physics Technician. The names of those persons involved in the patient's care will be entered on this form.

3. PREPARATION OF THE RADIOACTIVE MATERIAL.

a. Sealed Sources. The Health Physics Technician should insure that the log of the source use is correct and up to date.

b. Non-Sealed Sources. The Health Physics Technician has no specific duties that relate to the preparation of non-sealed sources.

4. SEALED SOURCE ADMINISTRATION.

a. The radiotherapist is responsible for the safe handling of the radioactive material from the time it leaves Radiation Therapy until he returns it.

b. Health Physics (Ext. 3573/5107) will provide a technician for assistance, upon request.

5. NON-SEALED SOURCE ADMINISTRATION.

a. The Nuclear Medical Service personnel are responsible for safe delivery of the radioactive material to the ward, and for obtaining sufficient absorbent paper and other protective equipment as indicated by the type of radioactive material.

b. A Health Physics Technician will normally be in attendance during therapeutic administration of unsealed radioactive material.

c. The Health Physics Technician will:

(1) Ascertain that the protective materials are located to provide protection of medical personnel.

(2) Remain available during the administration for assistance.

d. Following administration, the Health Physics Technician will:

(1) Monitor the administering staff and their equipment.

(2) Insure that radioactive laundry and waste containers are in the patient's room and are properly labled.

(3) Employing a manner which will obtain the desired results without alarming the patient, instruct him (her) in procedures for preventing the spread of contamination.

6. PATIENT CARE ON THE WARD.

a. When the therapeutic application is performed at a location other than the patient's room, the Health Physics Technician will go to the

ward as soon as practicable after the patient arrives.

b. The Health Physics Technician will:

(1) Ascertain that the patient's bed is placed in a position that will reduce any unnecessary exposure of adjacent areas.

(2) Mark on the floor a "safe distance" line ~~of 5 mR/hr~~. C-1

(3) Advise the patient of the potential hazard to visitors who spend too much time in the room. He will take care not to alarm the patient and will emphasize that the treatment has been prescribed for the patient and not the visitors.

(4) Prepare an information packet to be posted near the doorway to the patient's room. This packet will consist of:

(a) A completed WRAMC Form 426, "Radiation Therapy Monitoring Record".

(b) A copy of "Health Physics Aspects of Nursing Care of Radiation Therapy Patients with Sealed Sources" or a copy of the "Health Physics Aspects of Nursing Care of Radiation Therapy Patients with Non-Sealed Sources," as appropriate.

(c) A "CAUTION - RADIOACTIVE MATERIALS" sign.

(5) Place a Health Physics Identification card in the patient's Kardex File.

(6) Return to the ward at least once each day to insure that personnel are maintaining good Health Physics practices.

c. Removal of protective markings.

(1) If the patient was treated with a sealed source, the Health Physics restrictions (signs, etc.) will be removed after the source has been removed.

(2) If the patient was treated with a non-sealed source of radioactive material, all Health Physics restriction will remain in effect until the exposure rate at 1 meter ~~is 2 mR/hr or less~~. INDICATES A "NO RESTRICTION" LEVEL OF ACTIVITY. C-1

(a) The administering physician, as well as the ward officer, should be notified when Health Phyiscs restrictions are removed.

(b) Radioactively-contaminated laundry and waste will be removed from

the patient's room and the room will be monitored before it is released for normal occupancy.

d. If the patient is not being discharged from the hospital when the residual activity is acceptable, the Health Physics sticker in the Kardex File should be changed to read: "See instructions on reverse side of the "CAUTION - RADIOACTIVE MATERIALS" tag in the patient's chart." This tag should be changed to read: "This patient's body contains no significant quantity of radioactive material. This patient does not warrant any Health Physics precautions except in the following instances:

"(1) In the event of major surgery, notify Health Physics (Ext. 3575/5107) AND the physician who administered the radioactive material. The procedures in APPENDIX 4 (Health Physics Aspects of Surgery and Autopsy) to this ANNEX apply.

"(2) In the event of death, notify Health Physics (Ext. 3575/5107) AND the physician who administered the radioactive material. The procedures outlined in APPENDIX 3 (Death - Health Physics Procedures) to this ANNEX apply."

7. DISCHARGE OF THE THERAPY PATIENT.

a. The US Atomic Energy Commission License for Walter Reed Army Medical Center provides:

(1) Patients receiving radiotherapy with non-sealed Iodine-131 or Gold-198 shall remain hospitalized until the residual activity in the body is ~~30~~ 8 millicuries or less. C-1

(2) Patients containing radioactive implants, except Gold-198 seeds, shall remain hospitalized until the implant is removed.

b. Normally, radiation therapy patients will remain hospitalized until the residual activity in the body is 30 millicuries or less, regardless of isotope.

c. Clearances for discharge of the patient may be obtained from Health Physics (Ext. 3575/5107) or the therapist who administered the material.

d. If the patient is returning to a home where there are young children, an evaluation of the dose to them may be appropriate in determining the discharge date.

e. In no event will a patient be discharged if there is sufficient

radioactive material remaining in the body to warrant posting of the patient's room with the radiation warning symbol.

ANNEX S (MANAGEMENT OF RADIOACTIVE AND CONTAMINATED PATIENTS)
to WR 40-10 (Health Physics Regulations)

1. PURPOSE.

a. To delineate the responsibilities and describe the procedures for management of radioactive and radioactively-contaminated casualties.

b. To prescribe control measures to limit the radiation exposure to the staff treating the radioactive or radioactively-contaminated casualty.

c. To prescribe control measures to limit the spread of radioactive contamination through WRAMC resulting from handling a radioactive or radioactively-contaminated casualty.

d. To provide guidance in the management of radioactive or radioactively-contaminated casualties.

2. APPLICABILITY. This ANNEX is applicable to all individuals and activities at Walter Reed Army Medical Center in the handling of radioactive and/or radioactively-contaminated casualties.

3. DEFINITIONS.

a. A radioactive patient is a patient who is radioactive because of internal deposition of radioactive material or neutron activation of body tissues. If improperly managed, such a casualty could irradiate medical personnel and/or contaminate personnel, equipment and facilities.

b. A radioactively-contaminated patient is an individual who has external contamination on his clothing and/or body. After removal of radioactive contamination, the individual presents no radiation hazard.

4. GENERAL GUIDANCE.

a. Radioactive patients and contaminated patients will receive all necessary medical care and treatment at the earliest practicable time.

b. Radiation fields and radioactive contamination will not deter medical personnel in efforts to save life or limb, although slightly different techniques may be employed (e.g., rotating medical personnel to minimize exposure of any one individual, etc.).

c. Radioactively-contaminated patients will be decontaminated at the earliest opportunity consistent with their medical needs.

d. Every effort will be made to minimize radiation exposure and the spread of contamination during medical treatment.

e. Health Physics will provide a representative to advise on exposure and contamination control at the site of patient treatment. This representative will not impede patient care, but is expected to make recommendations to minimize personnel exposure and avoid the loss of resources due to radioactive contamination.

f. At the earliest possible time consistent with the medical needs of the patient, the attending physician will allow decontamination to begin. Decontamination will be undertaken by paramedical personnel under the direction and guidance of a Health Physics representative.

g. All contaminated clothing, equipment and waste materials will be retained by the Health Physics representative.

h. Contaminated valuables will be accounted for using the DA Form 8-178 (Patient's Deposit Record) in the conventional manner. These valuables will be retained by the Health Physics representative, who will account for them and will undertake to decontaminate them as soon as the situation permits, so that they may be returned to the Hospital Treasurer or the patient. Valuables and personal property of the patient will not be disposed of as contaminated waste without the written consent of the patient.

5. RESPONSIBILITIES.

a. The senior medical officer (or senior individual, in the absence of a medical officer) present at the scene of an accident is responsible to:

(1) Apply first aid to the patient (radiation casualty).

(2) Evaluate the injury of the patient to determine if immediate evacuation is required.

(3) Evaluate the contamination of the patient, if practicable.

(4) Decontaminate the patient before evacuation if the condition of the patient permits, and if such decontamination can be performed without aggravating the injuries.

(5) Employ contamination control measures.

(6) Arrange, undertake, or direct evacuation of the casualty to the

Attending Surgeon's Office, WRAMC, by the most practical means.

(7) Notify ASO (Ext. 3335) AND Health Physics (Ext. 3575/5107) that a radiation casualty is being evacuated to ASO.

b. The Attending Surgeon will:

(1) Notify Health Physics (Ext. 3575/2276/3481/5104/5107) that a potentially radioactive or radioactively-contaminated casualty is en-route and request a support team.

(2) Undertake treatment of the casualty emphasizing life-saving measures only until the Health Physics team arrives.

(3) Contamination control measures which are appropriate for an Emergency Room are quite similar to isolation techniques employed with a highly contagious patient. The movement of the patient throughout the hospital should be limited as much as possible until decontamination can be undertaken or contamination control measures implemented (e.g., have X-Rays taken in the Emergency Room, etc.).

(4) Exposure control measures under Emergency Room conditions are essentially as follows:

(a) Employ the minimum number of medical personnel necessary to evaluate and treat the patient.

(b) Limit the time individuals spend in the proximity of the casualty to the minimum consistent with his needs.

(c) Keep all nonessential personnel as far away from the patient as practicable.

(d) If the patient is highly radioactive, or contaminated, rotate or replace staff personnel frequently to limit individual exposure. Keep a record of all personnel who attended the patient including the length of time they were near the patient.

c. The Health Physics Officer, WRAMC, is responsible to:

(1) Provide a team, supplies, and equipment to support the care of radioactive or contaminated casualties.

(2) Provide exposure control and monitoring of staff personnel attending the casualty.

(3) Advise, direct or conduct decontamination of the casualty at the earliest time consistent with medical needs of the patient.

(4) Direct contamination control measures to limit the spread of contamination throughout the hospital.

(5) Survey the hospital areas for radioactive contamination.

(6) Advise on decontamination of hospital areas as early as possible following treatment of the casualty.

(7) Notify the members of the Subcommittee for Medical Evaluation of Radiation Workers of the WRAMC Radioisotope Committee of the radioactive or radioactively-contaminated casualty and assemble them so that they may make appropriate recommendations regarding the medical management of the casualty and parameters to be examined on a suspected or actual overexposure. Reference WR 40-19 (Radioisotope Committee).

(8) Notify the Public Affairs Officer (Ext. 2131) promptly of the incident and provide updated information periodically. Reference WR 360-4 (Nuclear Accidents and Incidents).

(9) Make appropriate reports to the Surgeon General, the Atomic Energy Commission, and other agencies in accordance with pertinent directives.

(10) Make a prompt investigation of the incident.

(11) Prepare and submit necessary reports of the incidents.

6. Specific guidance on the management of a radioactive or radioactively-contaminated patient to minimize exposure of the staff or the spread of contamination depends on the prevailing situation. Such guidance will be developed on the scene by the Health Physics representative. The recommendations of this representative should be heeded whenever possible, since radioactive contamination can necessitate very costly decontamination operations and result in the loss of facilities for many days.

7. Reference: NCRP Report Number 37 (Precautions in the Management of Patients Who Have Received Therapeutic Amounts of Radionuclides).

ANNEX T (HEALTH PHYSICS WORK PERMITS)
to WR 40-10 (Health Physics Regulations)

1. GENERAL. Health Physics Work Permits, WRAMC Form 697, provide researchers, experimenters, repairmen, maintenance men, and other personnel special instructions and/or clearance to accomplish specific tasks while minimizing the risk to themselves and others from radiological hazards.

2. SPECIFIC.

a. This permit is required before personnel may perform:

(1) Repair and maintenance operations on, with, or in equipment and/or areas specifically posted.

(2) Special work with radioactive material (e.g., welding, brazing, grinding, etc.) except where the personnel are working under the conditions and provisions already specified in WRAMC Radioisotope Authorizations to Use Radioactive Material.

b. In addition, Health Physics Work Permits shall be issued upon request of users for written control procedures, or whenever the Health Physics Officer considers it necessary to amplify or supplement current published Health Physics procedures and regulations.

c. The Health Physics Officer will post equipment and areas as follows:

(1) Equipment containing radioactive material (plumbing fixtures, ventilation stacks, fume hoods, radioactive waste disposal sinks, etc.) will be posted with a sign stating, "Approval of the Health Physics Officer is required before any maintenance or repair of this item is started."

(2) Areas including radiation control areas and other areas selected by the Health Physics Officer will be posted with a sign stating, "Occupancy of this area by maintenance personnel is prohibited without a Health Physics Work Permit, WRAMC Form 697."

d. Except in cases of emergency, Work Permits will be submitted to Health Physics in duplicate, giving the description, location, and time the work is to be accomplished. The duplicate copy, returned by Health Physics, will specify necessary control measures and/or restrictions.

e. Arrangements to handle emergency situations which require the

Health Physics Work Permit can be handled by telephone or personal notification to the appropriate Health Physics Section:

Location of Work	Health Physics Telephone Extension
WRAMC	3575 or 5107
WRAIR	3481 or 5107
AFIP	2276 or 5107
DORF	5168 or 5107

ANNEX U (CONTAMINATION CONTROL AND DECONTAMINATION PROCEDURES)
to WR 40-10 (Health Physics Regulations)

1. PURPOSE. To delineate responsibilities relating to contamination control and decontamination procedures at WRAMC.

2. RESPONSIBILITIES.

a. Health Physics is responsible for control of radioactive contamination and supervision of decontamination procedures.

b. Each Principal User is responsible for assisting Health Physics in the accomplishment of their mission by:

(1) Controlling contamination within his area of responsibility.

(2) Reporting all spills, releases, accidents, incidents, or unusual occurrences involving radioactive material promptly, so that contamination control may be initiated.

(3) Providing the resources for decontamination operations.

c. In general, the individual who causes contamination to occur performs the decontamination required. In cases where adequate resources are not available to perform the decontamination, the Health Physics Officer will, upon request, coordinate with other activities to secure the needed resources.

3. The contamination limits prescribed by Department of the Army are shown in the APPENDIX (Permissible Levels of Radioactive Contamination) to this ANNEX.

4. GENERAL. Air or water that contains radioactive material in excess of the concentrations specified in Appendix B, Table II, 10 CFR 20, shall be considered to be contaminated and shall be controlled and disposed of in accordance with the instructions of the Health Physics Officer.

5. Methods of controlling contamination which may be employed to minimize the spread of radioactive contamination include:

a. Use of personal protective clothing and devices, such as rubber or plastic gloves, laboratory coats, shoe covers, head covers, face masks, respirators, etc.

b. Providing and frequently using an exposure rate meter capable of detecting and monitoring contamination from the radioisotope(s) in use.

c. Using separate, specially-marked radioactive waste containers.

d. Limiting traffic and occupancy of work areas where radioactive materials are in use.

e. Patterning work flow and procedures to minimize transfers and manipulations of radioactive material.

f. Conducting procedures which generate radioactive aerosols, dusts, or gaseous products in fume hoods, glove boxes, or other suitable closed systems.

g. Designating and posting of contaminated and potentially contaminated areas during procedures which are likely to produce contamination.

h. Covering working surfaces with polyethylene and absorbent disposable material.

i. Using trays capable of containing a total spill of liquid radioactive material under experiments of this type.

j. Using double containers for vessels of radioactive materials which are easily upset, e.g., volumetric flasks.

k. Using polyethylene bags to contain waste and to line waste containers. If Tritium is used, the polyethylene should be replaced by or contained in kraft paper bags, since Tritium easily penetrates polyethylene and is retarded by paper.

l. Avoiding the use of house vacuum lines with radioactive materials.

m. Rigorously posting cabinets, refrigerators, ovens, etc., where radioactive material is used, so that all personnel will be advised of its presence. When the item is not used exclusively for radioactive material, the radioactive material should be separated from the other contents and conspicuously posted.

n. Establishing control points outside contaminated areas where personnel will monitor themselves for contamination with a suitable instrument before leaving the area.

o. Promptly cleaning up and monitoring all spills of radioactive material.

6. Decontamination methods are many and varied. The Health Physics Officer will supervise and advise on decontamination procedures.

a. Personnel Decontamination.

(1) Individuals with contaminated clothing should remove their clothing at the earliest opportunity.

(2) Decontamination of the skin should be attempted promptly after discovery of contamination. The skin should be washed thoroughly and repeatedly with a mild soap or detergent worked to a good lather with a soft brush. Care should be taken not to abrade the skin.

(3) Special decontamination of individuals beyond that described above will be under the supervision of Health Physics.

b. Surface decontamination will be undertaken only by personnel who are wearing protective gloves and, in some cases, protective clothing. Material used in decontamination will be disposed of as radioactive waste in accordance with instructions received from Health Physics.

7. HANDLING OF CONTAMINATED LAUNDRY.

Contaminated clothing and bedding will be collected by Health Physics personnel at the site of the contamination and taken for decontamination or disposal

APPENDIX to
ANNEX U (Contamination Control [illegible])

PERMISSIBLE LEVELS OF [illegible]

Contamination items and indications for action	Fixed or removable	Contamination level: Alpha: DPM per 100 cm²	Alpha: DPA per 100 cm²	Beta-gamma: mr/hr @ 1 in.	Beta-gamma: DPM per 100 cm²	Method of measurement
1. Clothing, including shoes						
a. Personal. Should be replaced, decontaminated or stored for decay if above.	Both	200	.....	0.2	.....	Probe
b. Protective						
(1) General. Should be replaced and/or decontaminated if above.	Both	1,000	.....	2.0	.....	Probe
(2) Laundry. Should not be released to public laundry if above.	Both	200	.....	0.4	.....	Probe
(3) Respirators. Should be decontaminated after use if above.	F	200	.....	*1.0	.....	Probe
	R	.....	None	.....	None	** Smear.
2. Containers. Prior to nonradiation use, should be decontaminated if above.	F	200	.....	0.2	.....	Probe
	R	.....	None	.....	None	Smear.
3. Laboratories and Work Areas						
a. Nonradiation areas. Require posting or decontamination if above.	F	600	.....	0.25	.....	Probe
	R	.....	30	.....	100	Smear
b. Fixation. Required if decontamination not possible and periodic check of fixation, if above.	F	1,000	.....	2.0	.....	Probe
	R	.....	200	.....	200	Smear.
4. Skin						
a. Body. Continue decontamination if above.	F	200	.....	0.06	.....	Probe
	R	.....	None	.....	None	Smear
b. Hands. Continue decontamination if above.	F	400	.....	0.3	.....	Probe
5. Vehicles						
a. Use in radioactive area. Should not be above.	F	1,000	.....	2.0	.....	Probe
	R	.....	300	.....	1,000	Smear
b. Used in nonradiation area. Should not be above.	F	500	.....	0.1	.....	Probe
	R	.....	50	.....	500	Smear

F — Fixed R — Removable

* At contact with any surface of the mask.

** Smears analyzed with a calibrated meter.

ANNEX V (HEALTH PHYSICS ASPECTS OF FIRE FIGHTING)
to WR 40-10 (Health Physics Regulations)

1. PURPOSE. To prescribe general measures to be followed to minimize radiological hazards associated with fire protection.

2. FIRE PREVENTION.

a. Whenever possible, flammable materials will not be stored with radioactive materials. When flammable materials must be stored in conjunction with radioactive materials, the manner of storage will be coordinated with the WRAMC Fire Prevention Branch (Ext. 3318 at Main Post, or 5317 at Forest Glen) to insure that the fire hazard is minimized.

b. Every effort will be made by the user to eliminate fire hazards within his area of responsibility.

c. During routine inspections by fire prevention personnel, the location of radioactive material will be made known to the inspector. The "CAUTION - RADIOACTIVE MATERIALS" warning which is to be posted on containers and rooms in accordance with instructions contained in ANNEX D to these Regulations will assist in meeting this requirement.

3. FIRE FIGHTING. Whenever firemen respond to a call in an area posted "CAUTION - RADIOACTIVE MATERIALS", the following protective measures will be employed to minimize radiological hazards:

a. Firemen will wear self-contained breathing apparatus, protective coat and boots.

b. Firemen will use survey instruments provided for this purpose (See the APPENDIX to this ANNEX).

c. Health Physics (Ext. 5107) will be notified that there is a fire in a posted area.

d. Personnel will stay in the area the shortest period of time necessary to accomplish the fire-fighting mission. Firemen will avoid unnecessary contact with equipment, opening of containers, or handling of debris.

e. Personnel who have entered the area will remain in the vicinity until surveyed and released by Health Physics personnel. This measure is prescribed to avoid unnecessary spread of radioactive contamination. In the event of personal injury, the provisions of ANNEX W to these Regulations will be followed in lieu of this provision.

4. SPECIAL CONSIDERATIONS.

a. During fire fighting in areas where large radioactive sources are located (e.g., animal irradiators, teletherapy unit, calibration unit, etc.), every effort will be made to cool the source with a stream of water if the heat of the fire might cause the lead shielding to melt. When the lead shielding melts, it may escape or change shape in such a way that a serious radiation hazard could result.

b. Reactor Radiation Alarms.

(1) There is a Radiation Alarm at the DORF Reactor. If the alarm is ringing, the firemen should be especially alert for radiation. Since the alarm is electrically operated, it may be ringing because of a fire-produced malfunction.

(2) The fact that the Radiation Alarm is not ringing does not necessarily mean that there is no radiation hazard. The fireman should always use a high range exposure ratemeter.

c. Health Physics will conduct classes for the Fire Department at least annually regarding the use of radiological survey instruments and radiological hazards associated with fire protection.

APPENDIX (INSTRUCTIONS TO FIREMEN)
to ANNEX V (HEALTH PHYSICS ASPECTS OF FIRE FIGHTING)

1. RADIAC INSTRUMENTS.

a. The WRAMC firemen are provided the following radiac equipment:

(1) Two (2) high-range exposure ratemeters.

(2) One (1) Beta-Gamma film badge per man.

(3) Six (6) Radiacmeters (IM-147 or equivalent).

(4) One (1) PP-1578 Radiacmeter Charger or equivalent.

b. Each fireman shall wear his film badge while on duty and shall leave it in a designated place in the Fire Station while he is off duty.

c. The high-range exposure ratemeters, IM-147 or equivalent, and the PP-1578 shall be kept in a box in the Fire Station and taken to fires that are reported to be in or adjacent to Radiation or Reactor Areas.

d. Personnel from Health Physics will periodically check the operation of radiac equipment.

e. The high-range exposure ratemeter shall be turned in to Health Physics quarterly for recalibration. Replacement instruments will be issued by Health Physics for interim use by the Fire Department.

2. NOTIFICATION OF HEALTH PHYSICS. In the event of fire in a Radiation Area, Reactor Area, or where a Radioactive Material warning sign is posted, notify Health Physics (Ext. 5107).

3. USE OF HIGH-RANGE EXPOSURE RATEMETER.

a. Prior to use of the high-range exposure ratemeter, it should be checked to insure proper battery function and calibration in accordance with the instruction sheet in the storage box.

b. The instrument should be ON for at least 30 seconds before use under normal temperatures (50-100^0 F) and for one (1) minute if the temperature is below 50^0 F.

c. Before arrival at the area, the instrument should be turned on to the lowest scale.

d. The areas within Radiation or Reactor Areas known to be near

sources of radiation should be monitored first. If the situation permits, the radiation source should be removed or protected from fire damage.

e. The instrument should be used as a guide so that radiation areas may be avoided in searching for survivors.

f. If the exposure rate is greater than 100 mR/hr, firemen shall not enter the area, except to save life, unless an officer from Health Physics, WRAMC, is present.

4. USE OF IM-147/PD AND PP-1578.

a. The IM-147/PD is charged to a zero reading by use of the PP-1578.

b. At the scene of the fire, the IM-147/PD should be read and a mental note made of the reading, if it is other than zero.

c. While engaged in lifesaving operations, or operations under the advice of the Health Physics Officer, read the IM-147/PD as often as the situation permits, so that your actions may be governed by the exposure limit that has been established.

ANNEX W (RADIOLOGICAL EMERGENCIES)
to WR 40-10 (Health Physics Regulations)

1. PURPOSE.

a. The primary purpose of this ANNEX is to insure that an individual who is known or suspected to have been involved in a radiation accident and/or incident that could have resulted in an internal and/or external exposure to ionizing radiation receives proper medical care, and that the possible radiation exposure is evaluated.

b. A secondary purpose of this ANNEX is to insure that the source of the accidental radiation exposure is contained, so that further exposure of personnel will be controlled.

2. GENERAL GUIDANCE.

a. It is assumed that radioactive material will be handled by qualified persons and in accordance with existing regulations and policies. It is expected that this ANNEX will be interpreted by those persons in the light of their knowledge of the relative radiotoxicity of the various radioactive materials (radionuclides) in their possession.

b. A radiation accident may be defined as an unforeseen occurrence, either actual or suspected, involving exposure or contamination of humans and the environment by ionizing radiation. The accident will be considered as occurring over a short period of time, from seconds up to several days. Chronic occupational or other long-term exposure will not be considered.

c. There are two ways in which humans can be exposed to ionizing radiation:

(1) External. The source of ionizing radiation may be outside of the body, so that the radiation strikes the individual and is absorbed, depending upon its physical characteristics. Radiation from X-ray generators, particle accelerators, sealed sources of radionuclides and reactors are examples of this type. The radiation may be beta, gamma, or neutrons. Alpha emitters present no significant external hazard. Particle accelerators may produce other particles such as deuterons, mesons, etc. All persons who are known or suspected to have been externally exposed to an acute dose (within a twenty-four (24) hour period) in excess of:

(a) Whole body, head and trunk, active blood-forming organs, gonads or lens of the eye -- 3 rem.

(b) Skin of the whole body and thyroid -- 10 rem.

(c) Hands and forearms, feet and ankles -- 30 rem.

shall be reported immediately to the Health Physics Officer, WRAMC (Ext. 5107).

(2) Internal. The source of ionizing radiation may gain entrance into the human body by inhalation, ingestion, injection or absorption through the intact or injured body surface. Radionuclides may also be formed within the body following exposure to an external source of neutrons. All persons who are known or suspected to have been internally exposed to radioactive material shall be reported to the Health Physics Officer, WRAMC.

(3) Suspected exposures to levels shown shaded in the bar chart, (See the APPENDIX to this ANNEX) should follow the procedures in 3-c below. Suspected exposures to levels shown unshaded in the bar chart should follow applicable procedures in 3-d and 3-e below.

3. In the event of an emergency, the most senior knowledgeable individual present will assume control of the situation and direct activities until relieved by proper authority. The exact actions and sequence of actions to be taken will be determined by the nature of the emergency. The following actions are typical responses to emergency situations (The sequence of these actions is highly variable.):

a. Restrict personnel associated with the emergency to a controlled safe area in the vicinity of the emergency to insure their availability and to limit the spread of contamination.

b. Call the Fire Department, if necessary.

(1) Main Section -- Ext. 3317

(2) Forest Glen -- Ext. 5317.

c. Minor spills involving little radiation hazard to personnel.

(1) Notify all other persons in the room at once.

(2) Permit only the minimum number of persons necessary to deal with the spill into the area.

(3) Confine the spills immediately.

Liquid spills:
Don protective gloves. Drop absorbent paper on spill.

Dry spills:
Don protective gloves. Dampen the spill thoroughly taking care not to spread the contamination. (Note: Water should generally be used except where chemical reaction with water would generate air contaminant. Oil should then be used.)

(4) Decontaminate.

(5) Notify Health Physics as soon as possible.

(6) Monitor all persons involved in the spill and cleaning.

d. Major spills involving radiation hazard to personnel.

(1) Notify all personnel not involved in the spill to vacate the area at once.

(2) If spill is liquid, and the hands are protected, right the container.

(3) If the spill is on the skin, flush thoroughly.

(4) If the spill is on clothing, discard outer or protective clothing at once.

(5) Switch off all fans. Do not turn off fume hoods.

(6) Vacate the room.

(7) Notify Health Physics at once.

(8) Take immediate steps to decontaminate personnel involved, as necessary.

(9) Decontaminate the area (Personnel involved in decontamination must be adequately protected).

(10) Monitor all persons involved in the spill and cleaning to determine adequacy of decontamination.

(11) Permit no person to resume work in the area until a survey is made and approval of Health Physics is secured.

e. Accidents involving radioactive dusts, mists, fumes, organic vapors and gases.

(1) Notify all other persons to vacate the room immediately.

(2) Hold breath and close escape valves, switch off fans, except fume hoods, if time permits.

(3) Vacate the room.

(4) Notify Health Physics at once.

(5) Ascertain that all accesses to the room are closed and post conspicuous warnings or guards to prevent accidental opening of doors.

(6) Report at once all known or suspected inhalations of radioactive materials.

(7) Evaluate the hazard and the necessary safety devices for safe reentry.

(8) Determine the cause of contamination and rectify the condition.

(9) Decontaminate the area.

(10) Permit no person to resume work in the area until a survey is made and approval of Health Physics is secured.

f. Injuries to personnel involving radiation hazard.

(1) Wash minor wounds immediately, under running water, while spreading the edges of the gash.

(2) Render first aid

(a) Stop bleeding

(b) Restore breathing

(c) Protect from shock

g. Evacuate casualties requiring immediate emergency medical aid to ASO by the most practical and expedient means consistent with the medical needs of the patient.

(1) Remove outer clothing of patient, if contaminated with radioactive material.

(2) Secure the person's film badge and place it in a labeled envelope.

(3) Wrap every patient evacuated in a blanket, sheet, plastic, etc., (except for the face) to contain any contamination.

(4) Notify ASO (Ext 3305/3401) that a contaminated patient is enroute, giving an estimated time of arrival at ASO, and advise the Attending Surgeon of all facts relating to the individual's radiation exposure.

(5) Accompany the exposed persons to the ASO, WRAMC.

h. Notify Health Physics of the emergency and advise whether any patients have been evacuated to ASO.

LOCATION	DUTY HOURS	IF BUSY OR NO ANSWER	AFTER HOURS
WRAMC	3575	2276/3481	5107
WRAIR	2276	3481	5107
AFIP	2276	3481	5107
MDW (IDS 198)	2276	3481/5107	5107
Forest Glen	5107	5104/5268	5107

4. Health Physics will respond to all radiological emergencies and will:

a. Provide technical advice as necessary.

b. Furnish additional resources (personnel, supplies, and equipment).

c. Supervise the reduction of radiological hazards.

d. Monitor the persons who were in the vicinity of the accident if there is a reasonable probability that they may have been exposed and/or contaminated.

e. Take action to prevent further contamination of personnel and equipment.

f. Make and/or coordinate all appropriate follow-up measures, reports, investigations, etc.

5. To insure the proper treatment of patients who may have been exposed to ionizing radiation, the provisions of WRAMC Letter, MEDEC-YHP, 18 Sept 73, Subject: Management of Radioactive and Contaminated Emergency Patients, will be followed. This letter will be posted in the WRAMC Emergency Room, all dispensaries, and clinics which would receive emergency patients.

6. NUCLEAR REACTOR EMERGENCIES. Reactor operations shall be performed with close attention to controlling and minimizing exposures from radioactive materials, including induced radioactivity and otherwise.

a. The Health Physics Officer, in conjunction with the reactor staff, will develop plans and procedures in accordance with applicable regulations to insure the health and safety (as pertains to ionizing radiation) of operating personnel, other on-site personnel, or off-site personnel.

b. All persons who are assigned to the reactor for duty or training, and those persons who routinely respond to reactor emergencies, shall be given periodic training in established emergency procedures.

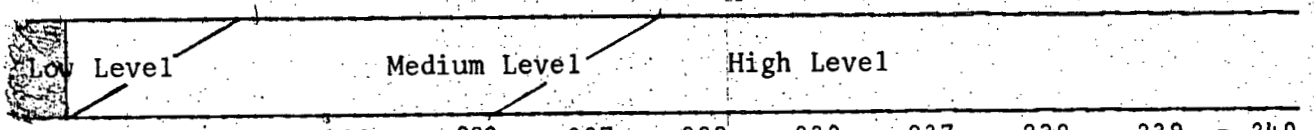
c. Persons who are authorized to conduct experiments in the reactor unaccompanied by members of the reactor staff shall be given instructions on the proper procedures to take in the event of a reactor emergency.

d. Records and reports of reactor emergencies shall be made in accordance with applicable regulations.

APPENDIX TO ANNEX W

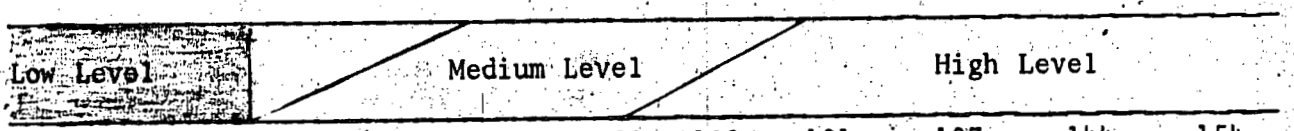
Hazards from absorption into the body.

Group 1. Very High Hazard.



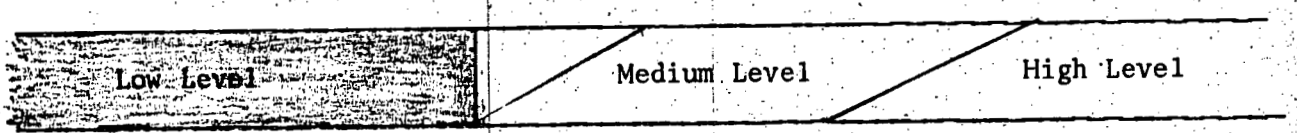
*Pb^{210}, Po^{210}, *Ra^{226}, *RA^{228}, Ac^{227}, Th^{228}, Th^{230}, Np^{237}, Pu^{238}, Pu^{239}, Pu^{240}
Pu^{241}, Pu^{242}, *Am^{241}, Cm^{242}

Group 2. High Hazard.



*Na^{22}, Ca^{45}, *Sc^{46}, *Co^{60}, Sr^{90}, *Ru^{106}, I^{129}, *I^{131}, *Cs^{137}, *Ce^{144}, *Eu^{154}
*Ta^{182}, Bi^{210}, At^{211}, Ra^{224}, U^{233}

Group 3. Medium Hazard.



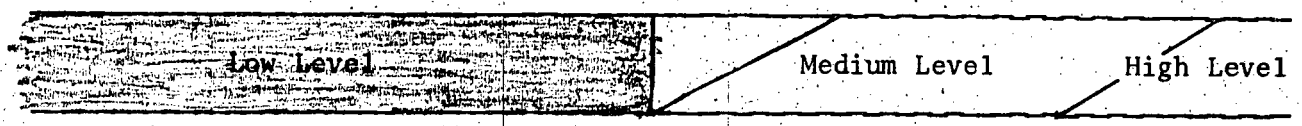
C^{14}, *Na^{24}, Si^{31}, P^{32}, S^{35}, C^{136}, *K^{42}, Sc^{47}, *V^{48}, *Cr^{51}, *Mn^{56}, *Mn^{56}, Fe^{55}
*Cu^{64}, *Zn^{65}, *Ga^{72}, *As^{76}, *Rb^{86}, Sr^{89}, Y^{90}, Y^{91}, *Zr^{95}, *Nb^{95}, *Mo^{99}, *Ru^{103}
*Rh^{105}, Pd^{103}, Ag^{105}, Ag^{111}, *Cd^{109}, *Sn^{113}, *Te^{127}, *Te^{129m}, *Ba^{140}, *La^{140}
Pr^{143}, Pm^{147}, Sm^{151}, *Ho^{166}, *Tm^{170}, *Lu^{177}, *Re^{183}, *Ir^{190}, Ir^{192}, *Pt^{191}
*Au^{196}, *Au^{199}, *Tl^{200}, *Tl^{201}, Tl^{202}, Tl^{204}, *Pb^{203}, Rn^{220}, *Rh^{222}, U^{235}

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Group 4. Low Hazard.

10μc	100μc	1mc	10mc	100mc	1c	10c



H^3, *Be^7, C^{14}, Ni^{59}, Zn^{69}, Ge^{71}, U^{238}, Natural Thorium, Natural Uranium, Noble Gases.

*Emits gamma radiation in significant amounts

For information on any isotope not listed contact Health Physics Office.

Note: All personnel are cautioned that in addition to the radiological hazard associated with the above listed isotopes many of these isotopes, especially the heavy metals, are also extremely toxic and proper laboratory handling procedures should be used at all times.

ANNEX X (HEALTH PHYSICS SUPPORT AFTER DUTY HOURS)
to WR 40-10 (Health Physics Regulations)

1. PURPOSE. To describe the Health Physics support capabilities available after duty hours and the procedures to be followed to obtain this support.

2. RESPONSIBILITIES.

a. The Health Physics Officer will:

(1) Develop procedures for notification of Health Physics personnel when Health Physics support is required after duty hours.

(2) Advise all users of radiation-producing devices and radioisotopes, Duty Officers, Fire Department, and Military Police of the method of contacting Health Physics personnel after duty hours.

(3) Provide, in easily accessible locations, stocks of emergency supplies and survey instruments which may be needed in the event of radiological emergency.

b. Military Police will:

(1) Monitor Extension 5107 after duty hours.

(2) Contact Health Physics personnel in the event of any requirement for after duty hours support in accordance with the procedures developed by Health Physics.

(3) Contact Health Physics in the event of burglary, vandalism, etc., in any area marked as containing radioactive materials.

(4) Receive shipments of radioactive materials arriving after duty hours at the Forest Glen Military Police Station and store them in the designated areas in the Health Physics Bunker (Bldg. 149A). CONTACT HEALTH PHYSICS IF ANY SHIPMENT APPEARS to HAVE BEEN DAMAGED.

c. The Fire Department will: C-1

(1) Notify Health Physics of any fires in areas marked as containing radioactive materials.

(2) Follow precautionary procedures for fire fighting in areas marked as containing radioactive materials (See ANNEX V to these Regulations).

d. Administrative Officers of the Day for WRAMC will seek the advice

and assistance of Health Physics on matters relating to radioactive material when necessary.

APPENDIX 1 (HEALTH PHYSICS INSTRUCTION TO MILITARY POLICE)
to ANNEX X (HEALTH PHYSICS SUPPORT AFTER DUTY HOURS)

1. GENERAL.

a. Since the WRAMC Military Police are not supplied with radiac instruments, they should not enter areas that are posted as Radiation Areas unless Health Physics personnel are present.

b. Military Police should recognize the Radiation Area and High Radiation Area signs and know the significance of the signs.

c. They should know how to contact Health Physics.

d. The principle role of the Military Police in radiological emergencies is to control crowds and traffic.

2. MILITARY POLICE RESPONSE TO DORF ALARMS.

a. Remote readouts and alarms from the Diamond Ordance Radiation Facility (DORF) are installed in the Forest Glen Military Police Station. When any of these alarms are actuated, the following procedures should be followed:

(1) Press reset button.

(2) If alarm resets, note the occurence and make no phone calls.

(3) If the alarm cannot be reset, determine which alarm is sounding and proceed as follows:

(a) Radiation Alarm.

1 Notify Health Physics in the usual manner.

2 Notify one of the DORF officials listed on the DORF Emergency Card.

(b) Fire Alarm.

1 Notify the Fire Department.

2 Notify Health Physics.

3 Notify one DORF Official from the DORF Emergency Card.

4 Follow normal procedures for Military Police in event of fire. Do not enter or approach the building without the approval of the Fire Department or Health Physics, both of whom will have radiac instruments.

c. Burglar Alarm.

1 If the Radiation Alarm does not sound, follow normal Military Police procedures for burglary.

2 Notify one DORF Official from the DORF Emergency Card.

3 DO NOT notify Health Physics unless the Radiation Alarm sounds.

(d) Overflow Alarm.

1 Notify one DORF Official from the DORF Emergency Card.

2 Make no other notifications unless requested to do so.

(e) Power Failure Alarm.

1 Notify one DORF Official from the DORF Emergency Card.

2 Make no other notifications unless requested to do so.

3 Stand by the DORF gate until power is restored. This is to provide physical security and fire watch since the alarm system will be inoperable.

4 If personnel restoring power detect a radiation hazard proceed as if a Radiation Alarm had sounded (para 2a(3)(a) above).

3. MILITARY POLICE NOTIFICATION OF HEALTH PHYSICS.

a. During Duty Hours, call Ext. 5107/5104/5268 for Health Physics Support.

b. If Health Physics Support is required after Duty Hours, or emergency calls are received on Ext. 5107, contact one individual listed on the Health Physics Notification Roster and allow each telephone number reached to ring ten (10) times before going on to the next individual. Senior Personnel are listed in order of the closeness of their residence to WRAMC. It is desirable to contact individuals at the top of the list, if possible.

APPENDIX 2 (INSTRUCTIONS TO DUTY OFFICERS)
to ANNEX X (HEALTH PHYSICS SUPPORT AFTER DUTY HOURS)

1. Health Physics support may be obtained at any time by calling Ext. 5107 and requesting a Health Physicist.

2. Any matter relating to radiation safety or a radiological emergency (e.g., radiation exposure, release of radioactive material, fire with radioactive materials present, spills, or radioactive contamination, etc.) should be referred to Health Physics for appropriate action.

3. Incoming shipments of radioactive material which arrive after duty hours will be delivered to the Forest Glen Military Police, who are provided proper storage accommodations for this material.

APPENDIX 3 (INSTRUCTIONS TO HEALTH PHYSICS PERSONNEL)
to ANNEX X (HEALTH PHYSICS SUPPORT AFTER DUTY HOURS)

1. MAINTENANCE AND CALIBRATION OF EMERGENCY EQUIPMENT.

a. The following Sections of WRAMC Health Physics will each maintain a cache of supplies and equipment to meet the potential emergency needs in that area.

(1) DORF Health Physics Section.

(2) WRAIR, AFIP, and MDW Health Physics Section.

(3) WRAMC (Hospital) Health Physics Section.

b. An inspection of each Emergency Cache will be conducted periodically by the responsible Section. Remedial action will be taken by the inspector to correct any deficiencies noted.

c. The Health Physics Nuclear Instrument Repairmen have the following responsibilities:

(1) Quarterly calibration of all portable radiation survey instruments, to include testing and/or replacement of batteries, as needed.

(2) Semiannual calibration of all dosimeters currently in use and/or stored as emergency equipment (TB 750-242-3).

(3) Performance of maintenance, as required, on all Health Physics instrumentation.

(4) Maintenance of orderly records to indicate that the above requirements have been met.

2. EMERGENCY NOTIFICATION AFTER DUTY HOURS. The Military Police at Forest Glen monitor Ext. 5107 after duty hours. They are provided with a Health Physics Notification Roster for the purpose of securing Health Physics support upon request from any individual. They are instructed to notify one individual from the Roster. The individual receiving the call shall:

a. Evaluate the request.

b. Direct any action which must be taken prior to his arrival.

c. Report promptly to WRAMC, secure needed emergency equipment, and

report to the scene.

d. Take such actions as are necessary.

e. Call in, or have the Military Police call in, additional personnel, if necessary.

f. Notify an officer of the Health Physics Office of serious problems, extensive contamination, overexposures, releases of radioactive material, etc.

g. Maintain an informal log of events.

h. Prepare a written report of the incident.

3. EMERGENCY SITUATIONS. In emergency situations, the Health Physics Officer may summon all military members of Health Physics to report to duty. Each member shall report promptly to Building 188, Forest Glen Section, unless instructed otherwise. He will put on a yellow Health Physics work coat or coveralls so that he may be readily identified at the accident area. He will wear his film badges and one each 0-200 mR, 0-50 R and 0-600 R dosimeter. He will equip himself with an appropriate survey instrument and a protective mask or self-contained breathing apparatus for his personal use.

4. The Health Physics Officer at the scene of the emergency will designate personnel to insure that film badges and other appropriate personnel dosimetry are distributed to those individuals requiring them. He will also insure that logs are maintained indicating to whom the dosimeter was issued (e.g., film packet number and/or dosimeter serial number), and the amount of exposure received by individuals wearing dosimeters.

5. Health Physics personnel will monitor emergency personnel and advise them concerning radiation hazards, but they shall not authorize exposures. Such authorization is a Command responsibility.

APPENDIX 4 (INSTRUCTIONS TO PRINCIPAL USERS)
to ANNEX X (HEALTH PHYSICS SUPPORT AFTER DUTY HOURS)

1. To minimize the possibility and severity of radiological emergencies, the following measures are strongly recommended.

a. At the end of the day, the equipment or material should be secured in order to protect janitorial, security and other personnel from inadvertent exposure.

b. All potentially hazardous sources of radiation should be labeled with caution signs.

c. Auxiliary equipment that may be contaminated, such as sinks, fume hoods, or working surfaces, should be posted with the appropriate sign.

d. Areas in which there is a radiation field should be posted appropriately.

e. Caution signs should be required when conditions are such that a person should not habitually occupy the area.

f. If the radiation level is so high that a worker should not remain in the area for more than one (1) hour, very strict controls should be established.

g. A security, fire and safety check should be performed in each area in which radioactive material is used or stored as a routine matter at the close of each day.

h. Radiation sources should be stored in such a manner that emergency or repair personnel would not receive a significant exposure under conditions short of disaster.

2. Health Physics support after duty hours may be obtained at any time by calling Ext. 5107 and requesting a Health Physicist.

3. Radiological emergencies are to be managed in accordance with ANNEX W to these Regulations.

SUPPLEMENT E

ADDITIONAL DOCUMENTS FOR RADIATION PROTECTION PROGRAM

1. Health Physics Memo No. 2, Bioassay Program
2. USAMRIID Memo No. 40-11, Health Physics Regulations
3. Health Physics Memo No. 9, Laboratory Facilities
4. Health Physics SOP No. 1-6, Leak Testing and Inventory of Sealed Sources
5. Health Physics SOP No. 1-7, Ventilation in Radiation Controlled Areas
6. Health Physics SOP No. 1-2, Counting Procedures
7. Health Physics SOP No. 2-2, Radioactivity Analysis Laboratory
8. Health Physics Memo No. 14, Gas Chromatograph Operating Procedures

7/11/7e

HEALTH PHYSICS
WALTER REED ARMY MEDICAL CENTER
Washington, D.C. 20012

MEDEC-YHP
MEMO 2 BIOASSAY PROGRAM 14 May 1974

1. PURPOSE. To establish procedures for bioassay measurements that are necessary or desirable to aid in determining the extent of an individual's exposure to concentrations of radioactive material.

2. GENERAL. All models, equations, assumptions and requirements for internal dosimetry are derived from those concepts outlined in ICRP publications 2, 6, 9, 10, 10A, and 12.

3. PROCEDURES.

a. It is the responsibility of the Principal User to notify Health Physics prior to the beginning of any operation that will utilize, at any one time, non-contained quantities of radioactive material greater than the operational level indicated in Table 1.

b. The proposed operation will be reviewed to determine the probable extent of individual exposure and the bioassay measurements required.

c. Scheduling of bioassay measurements will usually be made as indicated in Table 1. If the chemical form of an isotope is not readily detectable in the type of measurement indicated, other appropriate methods will be employed.

4. REPORTS AND INVESTIGATIONS.

a. An inquiry will be made of any positive results of bioassay measurements and where possible recommendations will be made to reduce exposure.

b. An investigation will be performed and submitted to the WRAMC Subcommittee for Medical Evaluation of Radiation Workers whenever continued operations have or would cause an indivudual user to exceed one-tenth of the Maximum Permissable Body Burden. The report will include all pertinent information concerning the particular operation: confirmation of analysis, time and nature of intake(s), chemical form of isotope(s) dosage calculations if required, and action taken or recommendations.

5. NON-ROUTINE OPERATIONS. Other monitoring procedures will be instituted when desirable or necessary in circumstances such as:

a. The conduct of non-routine operations with a known or suspected high hazard. The Principal User should contact the Health Physics Office if there is any doubt concerning the hazards of a planned operation.

b. A known accident.

c. Confirmation of internal contamination.

d. Repeated findings of spreadable radioactive contamination in laboratories.

1 Incl
Table 1

BOBBY R. ADCOCK
LTC, MSC
Health Physics Officer

BIOASSAY PROGRAM - TABLE 1

13 May 1974

ISOTOPE	OPERATIONAL LEVEL (mCi)	TYPE OF MEASUREMENT	FREQUENCY OF MEASUREMENT
H-3	100	Urine, 24 hour sample	Weekly and completion of study
Na-22	1	Urine, 24 hour sample	Monthly and completion of study
P-32	10	Urine, 24 hour sample	Monthly and completion of study
S-35	10	Urine, 24 hour sample	Monthly and completion of study
Cl-36	10	Urine, 24 hour sample	Monthly and completion of study
Ca-45	1	Urine, 24 hour sample	Monthly and completion of study
Fe-59	10	Whole body count Blood count	Every six months Monthly
Co-60	1	Urine, 24 hour sample	Monthly and completion of study
Zn-65	10	Urine, 24 hour sample	Monthly and completion of study
Rb-86	10	Urine, 24 hour sample	Semi-weekly and completion of study
Sr-90	1	Urine, 24 hour sample	Monthly and completion of study
Tc-99	1	Thyroid count	Monthly or upon any suspected injection
I-125	5	Thyroid count	Monthly
I-131	1	Thyroid count	Monthly
Cs-137	1	Urine, 24 hour sample Whole body count	Monthly and completion of study Every six months

DEPARTMENT OF THE ARMY
HEADQUARTERS, U.S. ARMY MEDICAL RESEARCH INSTITUTE OF INFECTIOUS DISEASES
FORT DETRICK, FREDERICK, MARYLAND 12701

MEMORANDUM
NUMBER 40-11

28 January 1974

Change No. 1

HEALTH PHYSICS REGULATION FOR RADIOISOTOPE UTILIZATION

1. The following changes should be made to Para 2, "RESPONSIBILITIES"

(a) Add (3) The USAMRIID representative on the WRAMC and Ft. Detrick Isotope committees.

(b) Change b. USAMRIID Radiological Safety Officer to read: "The Chief, Radiological Section, USAMRIID Animal Assessment Division, serves as the USAMRIID Radiological Safety Officer and the principal user of the Cobalt Irradiation Unit in Animal Assessment Suite 4. The Chief, Animal Assessment Division serves as the alternate".

2. This change sheet should be filed in front of the publication.

FOR THE COMMANDER:

DAVID E. LYNN
CPT, MSC
Adjutant

DISTRIBUTION
C
PLUS
1 - C, Health Physics, WRAMC

DEPARTMENT OF THE ARMY
HEADQUARTERS, U.S. ARMY MEDICAL RESEARCH INSTITUTE OF INFECTIOUS DISEASES
FORT DETRICK, FREDERICK, MARYLAND 21701

MEMORANDUM
NUMBER 40-11*

30 October 1973

HEALTH PHYSICS REGULATION FOR RADIOISOTOPE UTILIZATION

	Paragraph
Purpose	1
Responsibilities	2
Licenses	3
Radiation Equipment Utilization	4
Isotope Waste Disposal	5
Procedure for Removal of Radioactive Carcasses from Infectious Suites	6
Fire Department Responsibilities	7
References	8

APPENDIX A - Table of Maximum Inventory of Radioactive Materials
APPENDIX B - Disposal of Radioactive Waste by Co-User
APPENDIX C - Procedure for Removal of Radioactive Carcasses from Infectious Suites
APPENDIX D - USAMRIID Procedures for Ordering Radioactive Materials

1. PURPOSE.

To establish policy and procedure for radioisotope utilization at USAMRIID. This memorandum supplements Walter Reed Army Medical Center (WRAMC) Regulation 40-10 (WR 40-10) dated 15 June 1973 governing the radiological safety program for the use of material or equipment that produces ionizing radiation. USAMRIID personnel utilize radioisotopes in accordance with WRAMC Authorization #506A and WR 40-10 as implemented by this memorandum.

2. RESPONSIBILITIES.

a. Principal User - Scientific Advisor, USAMRIID.

(1) The single senior individual at USAMRIID who serves as the Principal User of isotopes for the entire Institute in accordance with WRAMC Authorization Number 506A.

(2) The responsible individual who insures that inventory quantities of each isotope available at USAMRIID do not exceed authorized maximum limits (Appendix A).

*This memorandum supersedes Memorandum 40-11 dated 14 April 1972.

b. USAMRIID Radiological Safety Officer.

The Chief, Radiological Section, USAMRIID Animal Assessment Division, serves as both the Radiological Safety Officer and the USAMRIID representative on the WRAMC Isotope Committee. The Chief, Animal Assessment Division serves as the alternate USAMRIID Radiological Safety Officer.

c. Health Physics Technician, USAMRIID.

Technician(s) assigned to the Logistics Division, USAMRIID, who are specially trained under the WRAMC Health Physics Officer, and who serve at USAMRIID as the full-time representative(s) of the WRAMC Health Physics Officer.

d. USAMRIID Isotope Committee Members.

The Scientific Advisor serves as the Chairman, Isotope Committee, and advises the Commander, USAMRIID, on all matters pertaining to the use of radioisotopes in research studies conducted at this Institute. The Radiological Safety Officer serves as the recording secretary; other members are designated by official orders and include at least one representative of each USAMRIID research division.

e. Division Chiefs, USAMRIID.

Report to the Principal User their nominations of candidates for designation as isotope co-users, trainees, or technicians. Disposition Form 2496 is used for this purpose. Such nominations are processed for approval in accordance with the provisions of WR 40-10.

f. Chief, Medical Division, USAMRIID.

Provides immediate local medical support as required in Annex F to WR 40-10.

g. Co-users at USAMRIID.

Individual research investigators who require isotopes for conducting their research studies.

3. LICENSES.

a. Isotope utilization at USAMRIID is conducted under the provisions of WRAMC's Atomic Ennergy Commission (AEC) Biproduct Material License Number 08-01738-02, and is specifically approved by the WRAMC Radioisotope Committee Authorization Number 506A (for non-human use) which is updated annually.

b. The model 81-16 CO-60 Irradiation Unit located in Suite AA4, Bldg 1425 is approved under WRAMC license 08-01738-05.

4. RADIATION EQUIPMENT UTILIZATION.

Model 81-16 CO-60 Irradiation Unit and the 1MEV Therapy X-ray unit: Use of these instruments is limited to trained personnel operating under the overall supervision of Chief, Animal Assessment Division.

5. ISOTOPE WASTE DISPOSAL PROCEDURE.

a. The disposal of radioactive waste is accomplished by the Health Physics Technician(s) in accordance with established WRAMC procedures, Safety Division, Fort Detrick regulations, and USAMRIID Safety Memorandum No. 385-3.

b. Disposal of radioactive waste by co-users: See appendixes B and C.

c. Isotope waste is normally transferred from USAMRIID collection areas on scheduled days by the Health Physics Technician; however, additional or special disposal problems are referred to the Health Physics Technician whenever they arise.

d. Co-users are responsible for providing the Health Physics Technician an accurate estimate of the amount of radioactive material by type in each waste container. The Health Physics Technician must report this information to the Chief of the Safety Division, Fort Detrick at the time waste containers are transferred to him for disposal.

e. Animal carcass waste is kept separate from all other types.

6. PROCEDURE FOR REMOVAL OF RADIOACTIVE CARCASSES FROM INFECTIOUS SUITES.

See Appendix C.

7. FIRE DEPARTMENT RESPONSIBILITIES.

The procedures specified in WRAMC Reg. 40-10, Annex V, Health Physics Aspects of Fire Fighting, apply to the Fort Detrick Fire Department. In case of fire, additional notification must be given to the USAMRIID Health Physics Technician or Principal User.

8. REFERENCES.

a. AR 755-15.

b. WRAMC Reg 40-10.

c. USAMRIID Memo 385-3.

FOR THE COMMANDER:

DAVID E. LYNN
CPT, MSC
Adjutant

DISTRIBUTION:
C plus
1-C, Health Physics, WRAMC

APPENDIX A

TABLE OF MAXIMUM INVENTORY OF RADIOACTIVE MATERIALS
(WRAMC AUTHORIZATION 506A)
As of 22 May 73

Item	Maximum Inventory Authorized
$^{3}H_{1}$ (Tritium)	550mCi
^{14}C (Carbon)	60mCi
^{32}P (Phosphorous)	200mCi
^{35}S (Sulfur)	20mCi
^{42}K (Potassium)	50mCi
^{45}Ca (Calcium)	20mCi
^{47}Ca (Calcium)	1mCi
^{51}Cr (Chromium)	20mCi
^{59}Fe (Iron) / (Ferrous)	10mCi
^{65}Z (Zinc)	50mCi
^{85}Sr (Stronium)	10mCi
^{125}I (Iodine)	100mCi
^{131}I (Iodine)	100mCi
^{169}Yb (Ytterbrium)	10mCi
^{198}Au (Gold)	35mCi
^{238}U (Uranium)	1 lb.

APPENDIX B

SUBJECT: Disposal of Radioactive Waste by Co-User.

1. Radioactive waste will not be disposed of through other than an approved means; all isotopes acquired by co-workers must be accounted for in toto, and all waste disposal must be accomplished in coordination with the USAMRIID Health Physics Technician(s). Discarding radioactive materials in sinks is not an approved disposal method for isotope co-users.

2. The isotope co-user will provide the USAMRIID Health Physics Technicians(s) a complete recording of the isotope contents of each radioactive waste disposition. The following information will be included on the tag attached to each bag of solid waste.

a. The name of the co-user responsible for the isotope(s) being used. This is the person charged for the isotope(s) in the health physics records.

b. The isotope(s) contained in the waste disposition.

c. An estimate of the total activity for each isotope contained in the package of waste. This estimate must be in millicuries or in microcuries; DPM or CPM will not be acceptable.

d. The date of the entry.

e. The type of waste, as explained in item 5 below.

3. The Health Physics Technicians will pick up the waste from the individual laboratories. The times of pick up will be coordinated with each investigator.

4. Except for the packaging of radioactive carcasses, only magenta colored plastic bags will be used for packaging radioactive waste. These bags should be sealed at the top and properly labeled. If there is danger of the bag tearing or being damaged by the contents, multiple bags should be used.

5. Radioactive waste must be packaged by the co-user according to the following classification and given to the Health Physics Technician(s).

a. Burnable solid waste: Waste products including paper, plastic, rubber, and other solid burnable materials.

b. Non-burnable solid waste: Glass and metal waste.

c. Bulk liquid waste: Liquids in large quantities. Keep isotopes separated as much as possible.

d. Flammable liquid waste: This consists of scintillation vials which contain flammable scintillation fluid. Test tubes or vials from gamma counters may be placed in non-burnable solid waste unless they contain flammable liquids.

e. Animal carcasses: This category includes serum or tissues which would decay if kept unfrozen.

APPENDIX C

SUBJECT: Procedure for Removal of Radioactive Carcasses from Infectious Suites

1. Carcasses of an individual monkey or groups of small animals are placed in 20" x 30" Chieftain nylon bags (an American Hospital Supply product). The bag is sealed by tightly rolling the open end and applying autoclave tape. Only this specific type of nylon bag should be used to prevent bag destruction by autoclave heat. This nylon bag is placed in a waterproof paper bag (Stock No. 8105-001-3245) and then placed in a hat box. The box is marked "Radioactive Waste" in pencil, and the contents of the box identified as outlined in Appendix B.

2. Multiple monkey carcasses may be removed simultaneously by an alternative method. Monkey carcasses may be placed in a 55-gallon barrel and permitted to accumulate until the barrel is 2/3 full. Wood shavings must be added periodically to absorb moisture during autoclaving. The barrel must be labeled as containing radioactive waste. The monkey number, date, and amount of radiation given to each is entered on a card on the barrel lid; the barrel is then kept in the walk-in cooler until ready to be autoclaved.

3. The box or barrel is placed in the exit-autoclave of the suite with its lid off and autoclaved on "dry" cycle. A one hour sterilizing time is used.

4. The Health Physics Technician(s) should be notified both 24 hours prior to the time that waste is passed through the autoclave and at the time it is to be picked up.

5. At the time of pick up, the Health Physics Technician will seal and properly relabel the container as radioactive and check to insure that the complete description of radioactive material within the container is listed on its lid.

6. In the event that the Health Physics Technician is not immediately available to remove the sterilized container, it will be retained within the suite, stored in the cold room, and steps 3, 4 and 5 above will be repeated.

APPENDIX D

SUBJECT: USAMRIID Procedures for Ordering Radioactive Materials

1. Ordering.

a. A request for purchase of radioisotopes will be submitted by co-user to the secretary of the Physical Sciences Division who will prepare five copies of Request for Issue or Turn-in (DA 3161) for each request for radioactive materials. Each request must be cleared through the alternate principle user and the Scientific Advisor. In the absence of the Scientific Advisor, the next senior member of the USAMRIID Isotope Committee may sign the request. The request will then be forwarded to the Medical Supply Office. Before the order is placed, the approval of Health Physics is obtained to assure compliance with license.

b. Distribution of DA 3161 is as follows:

(1) Original and 1 copy - retained by Medical Supply Officer.

(2) 1 copy - to Health Physics Officer, (WRAMC).

(3) 1 copy - to Health Physics Technician, (USAMRIID)

(4) 1 copy - to Physical Sciences Division.

2. Charge Account Sources for radioactive materials are as follows:

a. Abbott Laboratories.

b. Amersham/Searle.

c. Cambridge Nuclear Corporation.

d. Curtis Nuclear Corporation.

e. International Chemical & Nuclear Corporation.

f. Mallinckrodt/Nuclear Corporation.

g. New England Nuclear.

h. Schwarz/Mann.

i. E.R. Squibb & Sons.

3. Requests costing less than $250.00:

a. Requests costing less than $250.00 will be ordered by the Blanket Purchase Agreement (BPA) Ordering Officer, USAMRIID, provided the requested source is on Charge Account and approval is obtained through Health Physics Technician and the BPA Ordering Officer, USAMRIID. Approval will normally be granted when the requests are within the allowances set forth by the AEC License Number and USAMRIID maximum authorized inventory quantity.

b. Three weeks should be allowed for delivery of materials form the time the request is initiated. Delivery time is contingent upon availability of item(s) at the requested source.

4. Requests costing $250.00 or more:

a. Requests in excess of $250.00 must be forwarded to the Medical Supply Office, USAMRIID, for processing through Finance & Accounting, Logistics Division, and Material Branch, WRAMC.

b. Four weeks should be allowed for delivery of materials from the time the request is initiated. Delivery time is contingent upon availability of item(s) at the requested source.

5. Receipt of Radioactive Material.

a. During normal duty hours:

Upon receipt of radioactive material by personnel of the Medical Supply Office, a call will be placed to the Health Physics Technician, USAMRIID, notifying him of the receipt. The Health Physics Technician, NCOIC, or assistant NCOIC, Physical Sciences Division will pick up the shipment at the Medical Supply Office and verify the order and record its receipt in the Health Physics Log Book.

b. After normal duty hours:

(1) If received on post after normal duty hours, radioactive isotopes will be delivered to the CQ (Phase 1) by the Post Transportation Officer or other delivery agent.

(2) The CQ will inspect the package and sign receipts if required. Damage to any containers must be fully documented.

(3) The CQ will then read the storage instructions on the container. If refrigeration is required the container will be placed in the refrigerator located in room 883. If refrigeration is not required, the container will be placed on the workbench in room 883.

(4) Receipt and disposition of all radioactive material will be noted in the CQ report. If additional information or assistance is required the CQ will consult emergency procedures on file.

6. Actions to be Taken after Receipt:

a. Correct shipment:

If the shipment is correct, the packing list and/or invoice will be forwarded to the BPA Ordering Officer, USAMRIID. The purchase requisition will then be sent to the NCOIC, Physical Sciences Division, or his assistant, for signature. The Health Physics Technician, USAMRIID will then notify the Health Physics Officer, WRAMC, of the completed action.

b. Incorrect shipment:

If the shipment is incorrect, the individual checking the shipment should contact the BPA Ordering Officer, USAMRIID, who will in turn notify the Health Physics Officer, WRAMC, of the discrepancy. No action will be taken on the shipment until specific instructions have been received from the Health Physics Officer, WRAMC. If the shipment is to be returned, the shipping will be coordinated between the Transportation Officer, Fort Detrick Medical Supply Sergeant, and the Health Physics Technician, USAMRIID.

7. Authorized Allowance for Radioactive Materials.

Requests for radioactive materials will not exceed authorized allowances set forth by WRAMC Regulation 40-10 and WRAMC Authorization 506A (See Appendix A).

HEALTH PHYSICS
WALTER REED ARMY MEDICAL CENTER
Washington, D.C. 20012

*MEMO
No. 9

29 July 1969

LABORATORY FACILITIES (Radioactive Materials)

1. General. Walter Reed Army Medical Center devotes a considerable amount of effort to medical diagnosis, treatment and research and development, and as such all of the major activities of the Center maintain adequate laboratory facilities to support these endeavors.

2. Laboratories for the Use of Radioactive Material.

a. General. The principal user must provide the laboratory facilities and equipment necessary for the safe handling, storage, and use of all radioactive materials authorized for his project and insure that laboratory procedures and practices are instituted to provide protection of all personnel from the hazards associated with the use of this material. (Reference: ANNEX B, WR 40-10)

b. Specific.

(1) At the time the application is submitted to use radioactive material, the applicant must submit a description of the proposed use in sufficient detail so that Health Physics may evaluate the radiation hazards involved and the facilities available to the applicant.

(2) Health Physics will advise the applicant if additional facilities, equipment, supplies, and/or storage space for the safe use and disposal of the requested radioactive material is required.

3. Equipment Available for Temporary Loan from Health Physics.

a. Remote Handling. Several varieties of niptongs and griptongs, Atomic Accessories Remote Handling Tool Model RHT-60, assorted jaws and vices, remote forceps and magnetic handlers, remote pipettes, electric lift devices, etc.

b. Storage Containers. Several varieties of portable lead storage containers, steel safes, lead-lined boxes, metal drums filled with paraffin for neutron sources, concrete wells, steel drums for radioactive waste.

c. Shielding. A limited supply of lead bricks, high density concrete blocks, paraffin blocks, boraxal blocks, lead sheets, lead shot, steel plates, etc.

4. Instrumentation Available for Temporary Loan from Health Physics. See HP MEMO No. 10 - Radiation Detection Instruments.

5. Ventilation Control.

a. A fume hood of acceptable design must be available in the laboratory

* This MEMO supersedes HP MEMO No. 9, Title as above, dated 29 Apr 65

intended for the use of radioactive material when such a device is prescribed by the Health Physics Officer. Health Physics will perform all necessary inspections and surveys of fume hoods intended for the use of radioactive material; these will include the following:

(1) Measuring the pressure differential

(2) Measuring the flow rate

(3) Measuring the integrity of absolute filter installations when provided

(4) Any other test as directed by the Health Physics Officer after a review of the intended use of the facility.

b. Fume hoods with absolute filter assemblies, glove boxes, and hot cell facilities may be made available for temporary use upon request to Health Physics. These facilities are not necessarily mobile and some are located at other government agencies; therefore, if use of these facilities is determined to be necessary, coordination for this will be provided by Health Physics.

William F Kendall

WILLIAM F. KENDALL
MAJ, MSC
Health Physics Officer
WRAMC

HEALTH PHYSICS
WALTER REED ARMY MEDICAL CENTER
Washington, DC 20012

MEDEC-YHP
SOP
Number 1-6

15 February 1974

LEAK TESTING AND INVENTORY OF SEALED SOURCES

1. Purpose. The purpose of this SOP is to provide continuity in the standard leak testing procedures for sealed sources containing alpha, beta, and/or gamma emitting radionuclides possessed, used and stored at WRAMC and DORF. This SOP supplements WR 40-10.

2. General.

a. Despite the fact that many precautions are taken to prevent leakage, the radioactive materials do occasionally leak from the capsule. Steps must be taken to determine whether or not the sources are leaking. Radioactive material which leaks from a source is a major health hazard in that it may become airborne or transported in some other way to become inhaled or ingested by personnel in the vicinity. The purpose of leak-testing sealed sources is to detect the leakage of the radionuclide before it becomes a major health hazard.

b. The necessity for leak testing sealed sources can be appreciated when the damage that can be caused by one leaking source is considered. In the conduct of all leak-tests, personnel must be constantly aware of the techniques of safe handling and limit radiation exposure by considering distance, shielding, length of exposure, and total activity of the source(s) to be leak tested.

c. Each Health Physics Section (DORF, WRAIR, and Radiation Therapy, WRAMC) will leak-test each sealed source under their control in coordination with the NCOIC, HP Survey Section, Room 3, WRAIR.

d. Where a conflict of regulations (to include applicable USAEC Licenses and DA Authorizations) exists, the more restrictive regulation will be followed.

e. Sealed Source means any radioactive material that is inclosed in, or is to be used in, a container in a manner intended to prevent leakage of the radioactive material or any of its daughter products (See AR 40-37 and AR 700-52).

f. Each sealed source with an activity greater than 100 microcuries of beta and/or gamma and 10 microcuries of alpha received at WRAMC and DORF, containing radioactive material, other than 3-Hydrogen (Tritium), with a half-life greater than thirty (30) days and in any form other than gas, will be tested by Health Physics, WRAMC, for contamination and/or leakage prior to

* This SOP supersedes HP SOP Number 1-6, 15 August 1972

release to the user. However, if the vendor or source supplier furnishes a certificate indicating that a test has been made, the source need not be tested. Thereafter, all sources will be tested for leakage by Health Physics, WRAMC, at intervals not to exceed six (6) months, except that each source emitting alpha particles will be tested at intervals not to exceed three (3) months.

g. If there is reason to suspect that a sealed source might have been damaged, it will be tested for leakage before further use.

h. All sealed sources found to be leaking and/or contaminated will be immediately withdrawn from use by Health Physics. The Health Physics Officer will determine whether or not the source is leaking. If it is leaking, he will direct that it be resealed or disposed of in accordance with existing regulations.

3. Methods of Leak-testing.

a. Non-radium Sources

(1) Wipe test (for Alpha, Beta, and/or Gamma) - All exposed external surfaces of the object to be tested is wiped thoroughly with a piece of filter paper (paper towel cut in one (1) inch diameter circles is sufficient) of high wet strength and absorption capacity. The wipes may be wet or dry depending on the circumstances. The solution should not attack the material of which the source capsule or source holder is made. The wipe is allowed to dry, then the wipe is analyzed to determine the activity of the removable contamination.

(2) Scrub test (for Beta and/or Gamma) - The object to be tested is immersed in a solution which will not attack the material of which the container or source holder is made and which has been demonstrated to be effective in removing the radionuclide involved when the object is scrubbed with a brush under the surface of the liquid. All surfaces of the object are brushed thoroughly under these conditions. The total activity is determined in the residue obtained by evaporation of the solution.

(3) Immersion Test (for Beta and/or Gamma) - The object to be tested is immersed in a solution which will not attack the material of which the container or source holder is made and which, under condition of this test, has been demonstrated to be effective in removing the radionuclide involved. The solution is heated to 50° ± 5°C and held at this temperature for eight (8) hours. The absence of bubbles does not indicate that the source is not leaking. The total activity is determined in the residue obtained by evaporation of the solution. This test cannot be used on sources which are mounted in large assemblies, nor on sources having container material which will be adversely affected by the high temperature and water. This method often allows one to detect a leak before the material has had a chance to

leak from the source. It is the most difficult, time-consuming, and requires a greater radiation exposure to the individual than other techniques.

(4) Cellulose Tape Test (for Beta and/or Gamma) - This test is applicable to a device containing a sealed source in a source holder which has an opening through which the radiation emerges. This opening is kept covered for a minimum of seven (7) days with a piece of thin adhesive cellulose tape. The tape is carefully removed and the activity which may have been deposited on its adhesive side is determined.

b. Radium Sources

(1) Charcoal Sorption Test - Approximately 1/2 gram of activated charcoal is placed in a stoppered, glass test tube or equivalent container. The source may be placed directly on the charcoal or separated from it by a small wad of cotton. The source should remain sealed in the tube for 24 hours. Remove the source and immediately recap the test tube. Allow the sealed charcoal to stand for four (4) hours after which time, the sealed tube is counted by a gamma counting system. A blank charcoal control will be used to distinguish environmental radon from that produced by the source.

(2) Cocoon Test (Radium) - This test is applicable only to Radium or other sources from which a gaseous radionuclide, which is the parent of a particulate radioactive material, may leak. The source is completely surrounded by cotton (cocoon). This cocoon is placed inside a glassine envelope or other container and kept for twenty-four (24) hours. At the end of this period the source is removed from the container and the cocoon is counted with a portable alpha survey meter (PAC-1S or PAC-3G) or the source is removed and the bag resealed for a subsequent gamma spectral analysis for Radon daughter products.

(3) Another satisfactory method of leak testing is to line the source storage container with absorbent material and to analyze the lining material for radioactive contamination. The source should fit snugly in its storage well so that it is wiped by the absorbent material when being inserted and removed.

4. General Leak Test Procedures Employed at WRAMC and DORF.

a. In general, all beta and/or gamma sealed sources are leak tested by taking a one (1) inch diameter filter paper disc and obtaining a dry or wet wipe of the most accessible surfaces of the source or source holder in which the sealed source is permanently mounted.

(1) Gas chromatograph cells - Dry wipes are taken from the gas exhaust ports.

(2) AECL Gammacells - Dry wipes are obtained from:

(a) Upper external part of the ram

(b) Inside the irradiation chamber.

(c) Lower external portion of the ram.

(d) Floor beneath the ram.

(3) Cobalt Teletherapy and Cesium Calibration Units - Dry wipes will be taken from selected accessible surfaces of the teletherapy head or calibration port. The selected accessible surfaces should be those surfaces on which one might expect contamination (if there were to be leakage) to accumulate and shall include the inner surfaces of the most frequently used treatment cones or beam collimating device. The test sample shall be taken with the source in the "off" position.

(4) Other Beta or Gamma Sealed Sources - Dry wipes are obtained from the source directly or the most accessible surfaces of the source mount and/or container.

(a) Alpha sources are divided into four (4) groups: Radium check and calibration sources, brachytherapy sources, fission foils, and other alpha sources.

(1) Radium Check and Calibration Sources - A modification of the Cocoon Test is generally employed. The Radium source is sealed in a glassine bag or rubber-stoppered vial with a wad of cotton for a period of not less than twenty-four (24) hours. Immediately after the bag or vial is unsealed, remove the Radium source and reseal the bag or vial. The sample should be checked with an appropriate survey instrument prior to sending the sample to the HP R/A Lab. The sample shall be processed immediately due to the short-lived Radon daughter products.

(2) Brachytherapy Sources - These are leak-tested primarily by the Charcoal Sorption test.

(3) Fission Foils - Dry wipes will be obtained by wiping the most accessible surfaces of the mount and/or container.

(4) Other Alpha Sources - Dry and wet wipes will be obtained by wiping thoroughly the external surfaces of the mount, other than the radioactive surface of the source. Also, wet wipes will be made inside containers used for storage of alpha sources.

5. Routine Procedure for Handling Leak-test Samples.

a. Wipes

(1) Indicate on the filter paper (wipes) the side actively used in performing the leak-test.

(2) After performing the wipe test, place the wipe in a glassine envelope and/or plastic carrying block with tweezers. DO NOT CROSS-CONTAMINATE! Identify each wipe by source or reference number as applicable.

(3) Forward all wipes to the R/A Lab, HPO, WRAMC, for quantitative analysis with completed WRAMC Form 708 requesting appropriate analysis with proper identification as to radionuclide, serial number, location at time of sample, date, and time.

b. Cocoon tests and scintillation vials

(1) Indicate on each sample (top of scintillation vial) container the log reference number for the HP Section performing the test.

(2) Forward all samples to the R/A Lab, HPO, WRAMC, for quantitative analysis with a completed WRAMC Form 708 requesting appropriate analysis with proper identifications as to radionuclides, serial numbers (if appropriate), date, and time.

6. Evaluation.

a. Radium sources (Brachytherapy): A leakage range shall be established for each source or group of sources by repeated testing. If any leakage is detected greater than the baseline range at the 3σ level, the source(s) will be suspected as leaking; however, the maximum value of the upper limit will not exceed 0.001 microcuries. When the upper limit is exceeded by a group of sources, each source will be tested individually. If leakage is confirmed, the source(s) will be disposed of in accordance with existing regulations.

b. All others: If after analysis the amount of contamination removed from the source or surface is equivalent to 0.005 μCi (1.11×10^4 dpm), the source will be suspected of leaking. The source will be isolated, decontaminated if practical, and leak-tested twice more, at one-week intervals. If leakage is confirmed, the source will be disposed of in accordance with existing regulations.

7. Leaking Sealed Sources. All sealed sources found to be leaking will be handled in accordance with 10 CFR 34.25 and 10 CFR 20, and will be disposed of in accordance with AR 700-52 and AR 755-15.

8. Equipment, as required

a. Items utilized in leak test sampling; such as, filter paper discs, test tubes, etc.

b. Pair of long tweezers or forceps.

c. Rubber gloves.

d. Remote handling tools.

e. Film badge, wrist badge, and self-reading pocket dosimeter.

f. Protective clothing.

g. Glassine and/or plastic carrying block.

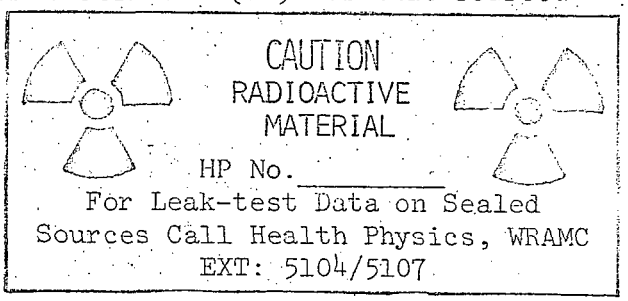
h. Appropriate radiation detection instrument.

9. Inventory of Sealed Sources

a. The WRAMC Form 0993(OT) will also constitute a record of inventory of the sealed sources at WRAMC and DORF with an activity equal to or greater than that specified in Appendix C, 10 CFR 20.

b. In accordance with the provisions of AR 700-52 the inventory records will document the specific item of equipment and/or radioisotope, the location of the item, activity, serial number of the source, responsible user, applicaple USAEC or DA Authorization number, expiration date, date and initials of the inventory officer. Entries will also be made when the source is transferred or disposed of in accordance with AR 700-52, AR 755-15, and/or TM 3-261.

c. All sealed sources or their containers will be labeled as shown below and identified with a Health Physics Control Number which will also be recorded on the WRAMC Form 0993(OT) for that source.



10. Records

a. Records of all WRAMC sealed sources will be maintained at HP, Room 3, WRAIR by consecutive entries on WRAMC Form 0993(OT) in terms of microcuries (μCi) pursuant to the provisions of 10 CFR 34.25 and AR 40-37.

b. Records of all HDL sealed sources at DORF will be maintained at the HP Section, DORF by consecutive entries on WRAMC Form 0993(OT) in terms of microcuries (μCi) pursuant to the provisions of 10 CFR 34.25.

c. Each Health Physics Section possessing or storing sealed sources (except HDL-DORF sealed sources) will forward a duplicate copy of the WRAMC Form 708 to the NCOIC, HP Section, Room 3, WRAIR for record purposes each time the sources under their jurisdiction are leak-tested.

d. Records of leak tests will be maintained as prescribed in the USAEC Licenses and DA Authorizations in accordance with the provisions of AR 340-18-1 through AR 340-18-15.

11. References

a. Title 10, Code of Federal Regulations, USAEC

b. AR 40-37, Radioisotope License Program (Human-Use)

c. AR 700-52, Licensing and Control of Sources of Ionizing Radiation

d. AR 755-15, Disposal of Unwanted Radioactive Material

e. TB MED 249 (NBSH-73), Protection Against Radiation from Sealed Gamma Sources

f. TM 3-261, Handling and Disposal of Unwanted Radioactive Material

g. NCRP Reports 28, 30, 33, 34, and 40

h. NBS Handbook 93

i. WRAMC Regulation (WR) 40-10, Health Physics Regulations

j. HP SOP 1-2, Counting Procedures

k. HP SOP 2-2, Radioactivity Analysis Laboratory

MEDEC-YHP
HP SOP 1-6

15 February 1974

1. ANSI N44.2 - 1973 American National Standard for leak-testing radioactive brachytherapy sources.

BOBBY R. ADCOCK
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HEALTH PHYSICS
WALTER REED ARMY MEDICAL CENTER
Washington, D. C.

*SOP
Number 1-7

2 March 1972

VENTILATION IN RADIATION CONTROLLED AREAS

1. Purpose. To establish standards and methods for evaluating ventilation control in laboratories using radioactive materials.

2. General. Procedures resulting in the generation of radioactive aerosols, dusts or gaseous products shall be conducted in a hood, dry box or other suitable closed system. Radioactive gases or material with radioactive gaseous daughters shall be stored in gas tight containers and kept in areas having approved ventilation.

3. Methods and Procedures. Ventilation rates of the laboratory hoods are measured with a calibrated Velometer. All rooms containing either laboratory hoods or gas chromatographs are checked to determine if a positive or negative pressure exists. This is accomplished by emitting a smoke cloud from a smoke tube (Mine Safety Appliance Co,, Ventilation Smoke Tube, Cat. No. BH5645, or equal) at a room exit, such as an undercut door, and observing the flow direction of the smoke. If the smoke cloud moves towards the interior of the room, more air is being exhausted than supplied and therefore a negative pressure exists. If the smoke cloud moves out of the room, more air is being supplied than removed and therefore a positive pressure exists. During this check all hoods and other exhaust fans are operating, as well as all air-supply equipment, including the air-conditioning systems.

4. Inspection of Ventilation Control Devices Used in Radiation Controlled Areas. Survey of these areas will be made as directed by the Health Physics Officer to determine that adequate pressure differential and flow rates exist, and that airflow characteristics of the hoods and rooms containing hoods are correct. For handling low to moderate levels of radioactive materials; the average velocity through openings in the hood shall be 100 fpm.For highly toxic or high-level radioactive material, the velocity thru the opening must be raised to an average of 125-200 fpm

5. Testing of Absolute Filters. Health Physics will periodically evaluate the quality of absolute filters by use of the Dioctyl Phthalate Smoke (DOP) test.

6. References.

* This SOP supersedes SOP Number 1-7, 24 January 1967

a. Title 10, Code of Federal Regulations, U.S. Atomic Energy Commission.

b. National Bureau of Standards Handbooks 51, 73, and 92.

c. Schulte, H. P., et al.: "Evaluation of Laboratory Fume Hoods," AECU 2859, U. S. Atomic Energy Commission.

d. May, J. W.: "The Physics of Air," American Air Filter Company, Inc., Louisville 8, Kentucky.

e. Blatz, H., Ed: "Radiation Hygiene Handbook," McGraw-Hill Book Company, Inc., New York.

f. Blatz, H.: "Introduction to Radiological Health," McGraw-Hill Book Company, Inc., New York.

g. Parrish & Schneider: "Inplace Testing of High Efficiency Filters," NRL, August 1963.

2 Incl
ANNEX A
ANNEX B

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WRAMC

GUIDELINES IN VENTILATION CONTROL

ANNEX A to
SOP 1-7
Health Physics, WRAMC

2 March 1972

1. Purpose. To provide guidelines in ventilation control.

2. General. The ventilation system should be designed to permit air flow in such a direction that any radioactive material picked up by the air will flow away from the worker. In the design of new installations, the air flow should always be from a noncontaminated area toward the contaminated or potentially contaminated area. Poor ventilation is difficult to correct after an installation has been completed. It is always more satisfactory to install a correct system initially than to try to overhaul a poorly designed setup. A good system of laboratory ventilation will confine the toxic contaminant, exhaust it with suitable duct work and fans, and pass this material through a collector or scrubber as needed before releasing it to the neighborhood. The design of a proper ventilation system will also provide sufficient air to make up for the amount exhausted.

a. Hood Design. A laboratory hood is a simple enclosure in which work can be carried out without toxic materials escaping. Materials in the enclosure can become airborne and escape by agitation from chemical or mechanical action, by thermal action from chemical reactions or heating devices, and by the syphon action from cross-currents of air. In order to keep the material from escaping from the enclosure, sufficient air should be exhausted to create an indraft through the face of the hood. This indraft must be strong enough to overcome the actions which tend to allow materials to escape. For handling low to moderate levels of radioactive materials, the average velocity through openings in the hood should be 100 fpm. For highly toxic or high-level radioactive material, the velocity through openings should be raised to an average of 125 to 200 fpm. At excessively high velocities, on the other hand, radioactive materials can be drawn out of open containers, contaminating the entire hood area.

In some cases, faulty circulation of air through the hood opening can be improved by increasing the volume of air exhausted and thus the velocity through the hood face by restricting the opening or by providing streamlining baffles along the edges of the air opening. Instrument checks on the velocity of air entering the hood should be performed under the various conditions encountered during actual operations. Checks of air flow patterns with a small source of smoke can indicate the presence of cross-drafts and the possibility of pulling material from the hood.

The placement of the hood in the laboratory is important in respect to cross-drafts, which can pull material out of the hood. In general, a hood should be located well away from the doorway where the supply air must enter.

In some cases, during periods when the hood is unattended, it may be practical to use somewhat lower velocities, 75 to 80 fpm. Dual speed fans will permit operation at the higher velocity while the hood is in use and at the lower velocity when it is closed.

(1) Changes to Remedy Defects in Commercial Hoods.

(a) To reduce excessive use of conditional air.

1. "Pressurized" hoods, with jets of unconditioned air along sides and top, which furnish most of hood air. Unsuitable for work with radioactive materials since exhaust failure would cause positive outward flow of air which would contaminate the entire area.

2. Use of 50 fpm face velocity with airfoil sides and bottom. This may cause excessive susceptibility to cross-drafts.

3. Reduction in face area is the best solution. It may be accomplished by sliding doors, limiting open face area while giving access to entire hood.

(b) To remedy increase of face velocity with door closing.

1. By-pass dampers.

a. Mechanical linkage with door.

b. Gravity-operated damper.

c. Electronic control.

2. Better hood design (shape).

a. Remove corner and center posts.

b. Avoid excessively depressed bottom.

c. Provide airfoils on bottom edges for best airflow pattern.

(2) Proper Use of Hoods.

(a) Avoid cross-drafts from propeller fans, open doors and windows, and rapidly walking past the hood.

(b) Check air velocity; if velocity is less than 100 fpm, mark positons of door for 100 and 150 fpm on hood edge.

(c) Keep sources of contamination, flames, and vapor sources at least 6 inches inside hood.

(d) Avoid leaning into hood.

(e) The inside walls of the hood should be painted with strippable paint; this aids in decontamination.

(3) Design Factor.

(a) Conventional duct design.

1. Approximately 4,000 feet per minute velocity.

2. Elbows should have a radius of at least two (2) diameters.

(b) Airflow Resistance.

1. Varies as the square of the velocity.

2. Filter resistance must be added to duct resistance; high-efficiency filter will have one (1) inch of water resistance when clean; should be discarded when resistance reaches two (2) or three (3) inches of water.

(c) Fan Selection.

1. Fan must be able to move a specified amount of air against the resistance of the duct and fittings plus the resistance of a dirty filter.

2. Centrifugal fan is most suitable; axial flow (propeller type) fans cannot move air against resistance.

3. Fan should be located at end of duct so that all duct work is under suction, and leakage is into the duct system.

b. Glove Boxes. Elements emitting only alpha particles (or very soft beta rays, i.e., ^{3}H or ^{14}C) can be handled even at high levels in completely enclosed containers known as glove boxes. Rubber gloves extend through hermetically sealed ports into the box and enable one to handle the radioactive material without contaminating his hands or lungs. For higher energy beta particles and gamma rays gloves do not offer sufficient protection, and they are frequently replaced by mechanical manipulators operated from outside the box. This complication, along with

the shielding required for medium or high level work, makes the dry box much more expensive than the larger chemical hood.

Glove boxes should be provided with air locks through which samples can be inserted or removed. In such air locks, the sample is inserted in the air lock through one door which is then closed and the other door opened to remove the sample. Since all facilities are totally enclosed in the hood, it may be desirable to provide exterior controls for all services such as water, gas, electricity, etc.

Glove boxes are frequently provided with exhaust ports or fans and filters. Exhaust volumes of 20 to 30 cubic feet per minute will maintain a 50 feet per minute velocity indraft at any opening in a typical size and design of glove box. If intake filters are used, they should be located in such a position that the worker's body will not be exposed to the escaping material if there is an explosion or surge of pressure which could rupture the filter.

c. Exhaust Systems. The exhaust system is designed to remove from the laboratory the airborne materials which are picked up in the hood. To safely vent the contaminated air, it may need to be filtered, scrubbed (or otherwise treated) and discharged at such velocities and elevations that it will not reach ground level at more than maximum permissible concentrations. Cleaning equipment should be selected with a view to the corrosive and toxic materials handled and the varying requirements for removal of radioactive materials. A choice of improper cleaning equipment will frequently result in efficiencies lower than needed or rapid deterioration of the cleaning material. Filters are available to achieve the high decontamination necessary for radioactive materials and for the particle size range which results in the greatest retention following inhalation exposure.

In a proper laboratory ventilation system, the duct work inside the building is under negative pressure. Under these conditions any leakage due to poor construction or corrosion of the duct system will be into the ducts and the radionuclides will be confined. To accomplish this, the fan must be located not on top of the hood but outside the building or at the point where the exhaust leaves the building. Although this may require weather-proofing the motor, it may be an advantage when flammable material is handled, because explosion-proof construction is not then required for the motor. Duct work connecting several hoods should have streamlined connections. Branch ducts should enter at angles of 30 to 45 degrees in order to permit better passage of air at high velocities. In such multiple installations, care should be taken to see that the exhaust system is balanced so that one hood does not provide the bulk of the air for the system.

Velocities of air in ducts should be great enough to maintain minimum transport velocities for the material being conveyed. Usual range of transport velocities for particulate material is 3500 to 4500 fpm.

In hoods where large quantities of water are handled, it is necessary to provide some means of removing the condensation which collects in the duct. When the system is intended to handle corrosive materials, the duct work should be of material resistant to corrosion.

The discharge should be at least five to ten feet above the laboratory roof, located so that fumes will not be carried back into the laboratory or into the air intake of adjacent buildings. Caps for weather protection obstruct the exhaust, directing it back down to the roof where it may be carried into the air intakes. The most practical fan discharge is the straight vertical stack suitable drain connection in the housing. When necessary to discharge high level wastes to the atomsphere, independent stacks may be located downwind from the tallest nearby building at a distance of two or three times the building height. Details of the metereology and dilution of radioactive materials in the atmosphere are found in other references.

Clean air must be supplied to replace the air in the room with an exhaust system if contamination control is to be successful. If adequate air is not supplied to the room, the capacity of the exhaust system and the air velocity at the face of the hood is reduced. If there are multiple exhaust hoods and no makeup air, the airflow may be reversed through a hood that has a smaller fan or is turned off.

In building design, ventilating air may be admitted to offices, corridors, etc., and exhausted through rooms for low and high level work in order by control of static pressures. In a large laboratory with several rooms for radioactivity work, controls should be supplied to properly balance the flow of air from one room to the next and from one hood to another. High velocity air movements can be responsible for spread of contamination and should be avoided.

3. Airborne Hazards.

a. Laboratory air and air discharged from the laboratory should be monitored for radioactivity if there is any possibility of airborne contamination at hazardous levels.

b. Continuous sampling of airborne particulates can be used provided the samples truly represent the air being breathed. Airborne contamination may remain localized and fixed instruments may fail to indicate the extent of contamination.

c. Assays for long-lived alpha-emitting particulates are complicated by the fact that maximum permissible concentrations may be less than the naturally occurring decay products of radon and thoron. Studies on concentrates may be required in order to evaluate the hazard properly. Any assays for airborne alpha-emitters should be supplemented by a careful analysis of the physical circumstances giving rise to the hazard. Protective measures should be instituted if there is a chance that alpha emitters may become airborne.

d. Radioactive, chemically active gases can be concentrated by chemical methods from a known volume of air and assayed by laboratory counting techniques.

e. In general, methods for assaying radioactive, noble gases are unsatisfactory because of the difficulty of concentrating a suitable sample. Some noble gases can be condensed with liquid air, but others require lower temperatures.

f. Radon and thoron present particular problems because each has a number of radioactive daughter products. Radon and thoron can be condensed with liquid air. To evaluate properly the hazard associated with these isotopes, it is necessary to know the stage of decay of the sample assayed. Consideration should be given to the need for ventilation of rooms used for radium storage facilities.

4. Air-Sampling Equipment and Methods.

a. The concentration of radioactive materials in air is determined by a laboratory count made on suitably collected and prepared samples. Filters, electrostatic precipitators, or impingers of various designs can be used to collect the samples. Care must be taken to insure that the sampling device collects all particle sizes desired.

b. In a filter collector a known volume of air is drawn through a specially designed filter paper on which the particulates are deposited. The activity of the paper is determined with a suitable laboratory-type instrument.

c. Particulates carried by a known volume of air can be deposited in an electrostatic precipitator from which the collecting electrode can be removed and either used as an electrode in a proportional counter or counted by other means.

d. Electrostatic precipitators should not be used where explosive fumes may be present.

e. Impingers collect particulates as a jet of air is directed against a glass slide or other suitable backing which is usually coated with a thin layer of oil or vaseline. The deposit from a known air volume is counted by usual methods.

f. Non-condensable gases should be sampled with special equipment devised for the particular material.

g. The size of the air sample may vary depending on the conditions. A sample of 10 m^3 is sufficient for practical assays of alpha contaminants down to one-tenth of the maximum permissible concentration.

h. Direct counting from the surfaces on which the sample has been collected is desirable. Beta and gamma radiations can be determined by using a G-M tube of known geometrical efficiency. Alpha particles can be counted in a proportional counter or an ionization chamber of known geometrical efficiency.

i. When alpha particles are being counted, corrections should be made for the loss due to penetration into the filter material. Such correction factors can be obtained by chemical analysis of a number of filters exposed in the same location.

This guideline was prepared by Captain Gordon M. Lodde, Health Physicist, Chief, Reactor and Survey Branch, Health Physics, Walter Reed Army Medical Center, Washington, D. C. 20012

*ANNEX B to
SOP 1-7
HP, WRAMC

2 March 1972

Absolute (High Efficiency) Filters

1. Purpose. To provide guidelines for acceptence, testing and inspecting absolute filters.

2. General.

a. Requisitions for filters should state that compliance with Military Specification MIL-F-51068A is required.

b. To insure the high degree of filtration required for high (99.97%) efficiency filters, each filter should be checked for possible leakage and filter damage before and after initial installation.

c. There is the possibility of undetected leakage developing through improper installation. Typical causes of leakage are: improper filter gasket seating in the frames, gaps between filter frame and housing, mishandling during installation, and the inherent fragility of high efficiency filters.

d. Because of these possible causes of leakage, an in-place test for filter efficiency will be made after installation.

3. Acceptance and Storage

a. On Receipt:

(1) Inspect shipping container for any obvious damage (absolute filters are easily damaged and if the container shows signs of abuse it is very likely that the filter also suffered.) before removal from carrier.

(2) Carefully remove filters from container and visually inspect filter.

(3) With a strong light behind the filter inspect for breaks, cracks and pinholes.

(4) Ascertain that the gasket is complete and unbroken.

(5) Examine the adhesive seal around the filter face to be certain it is complete and has not separated from the frame.

(6) Reverse filter and inspect the other side.

* This Annex supersedes Annex B to SOP 1-7, 24 March 1972

b. Storage:

(1) If the filter is not to be installed immediately it must be returned to its original container with packing inserts.

(2) Filters should not be stored with other materials because of possible damage from such material.

(3) Filters larger than 20" x 20" x 5" should not be stacked more than 3 high.

4. In-place Filter Testing.

a. Test Method and Equipment.

(1) The method for field checking the integrity of the particulate filter is an adaptation of the method developed by NRL.

(2) The method consists of generating an aerosol upstream of the filter and measuring the aerosol concentrations, both upstream and downstream of the filter.

(3) The major pieces of equipment are an aerosol generator and a particle detection instrument.

(4) The aerosol generator produces a polydispersed aerosol by the atomization of liquid dioctylphthalate (DOP) with compressed air.

(5) From 20 to 30 PSI air pressure the aerosol particle size generated ranges between 0.1 and 2.0 micron with 95% under 1.0 micron. Average size is 0.9 micron.

(6) Particle detection is based on measuring the light scattering power of the aerosol in the air stream.

(7) The 0.3-μ particle was selected by the Army Chemical Corps as the optimum size, since it is considered to be the most difficult to remove by filtration. In general, particles of this size are too small to be collected by impaction and too large to have a tendency to be caught by random Brownian motion. ORNL tests have shown the difference in particle sized 0.9 and 3-μ to be relatively unimportant for practical testing applications within the precision of measurement requirements.

(8) A polydispersed aerosol of DOP, produced by atomization of the liquid with compressed air, is discharged into the system through any convenient air intake ahead of the filter bank.

(9) The concentration of the unfiltered smoke is then measured, by means of the forward light scattering photometer, from samples removed from the system ahead of the filter bank.

(10) The concentration of the filtered air is measured downstream of the filters. The efficiency of the filtration system is then calculated from the concentration of the aerosol before and after the filters.

(11) In order to conduct this test properly, there must exist a sufficient length of duct between where the aerosol is introduced and the filter bank, to induce thorough mixing of the air and DOP particles.

(12) If a representative upstream sample cannot be obtained for the reasons indicated above, a reliable in situ test is still possible. In this instance the aerosol is introduced in the same manner, but only filtered samples are removed for concentration determinations. The equivalent upstream concentration is then measured indirectly by installing the smoke generator downstream of the filter bank and sampling further downstream before or after the blower. This indirect method is reliable if care is exercised in maintaining the output of aerosol and airflow through the system constant during the testing period.

(13) An alternate, indirect method of determining the upstream aerosol concentration is based on the fact that the output of a generator depends only on the pressure of the compressed air at the generator and the level of the DOP. Each smoke generator is calibrated in a system of known airflow, and an Output vs Pressure is drawn. Then, if the airflow in the system under test is known or can be accurately measured, the upstream aerosol concentration is calculable from the calibration curves.

b. Filter Facility Preparation.

(1) Each filter facility to be tested must be provided with a sampling port upstream and downstream of the filter.

(2) The diameter of this port should not be smaller than two inches and need not be larger than four inches in diameter.

(3) It is also necessary to provide a means of injecting the aerosol into the system. The aerosol should be injected far enough upstream to provide thorough mixing before it arrives at the upstream sampling probe location.

c. See WRAMC HP TP 1-7-1 for DOP test procedures.

5. Reference. TID-7023 High Efficiency Particulate Air Filter Units, USAEC

HEALTH PHYSICS
WALTER REED ARMY MEDICAL CENTER
Washington, D.C. 20012

SOP
Number 1-2*

10 June 1974

COUNTING PROCEDURES

1. Purpose. To provide standard counting procedures and methods for statistical analysis in order to insure valid, economic, and rapid assays of samples submitted for radioanalysis.

2. Evaluation of Counting System Performance.

a. General. Before anyone attempts to calibrate a counting system he should have assurance that the system is electronically adjusted for optimum efficiency and that it will, when so adjusted, detect radiation with an acceptable degree of accuracy and dependability.

b. Electronic Adjustment. In accordance with the counting system instruction manual the high voltage, sensitivity, and attenuation should be adjusted for optimum counting efficiency.

c. Chi-Square (χ^2) Test. Each counting system should be given the following performance test before it is calibrated and every month thereafter. It it does not pass the test it should be turned in to the Combined Maintenance Section for service.

(1) Obtain a sturdy, long half-life, moderate curiage source of approximately 10^4 dpm. This will be known as the "check source".

(2) Make 20 one-minute counts with the check source. Tabulate the following data in three columns (See Figure 1, page 4):

(a) Net Counts Per Minute (Gross cpm - BG cpm) $\equiv \chi$

(b) Deviation of χ from $\overline{\chi} \equiv (\chi - \overline{\chi})$

Note: $\overline{\chi} \equiv$ average value of the 20 one-minute counts

(c) $(\chi - \overline{\chi})^2$

(3) Sum the entries in the third column and divide this number by $\overline{\chi}$. The quotient thus obtained is called chi-squared (χ^2).

$$\chi^2 = \frac{\Sigma(\chi - \overline{\chi})^2}{\overline{\chi}}$$

(4) Table I, following, lists the numerical values of χ^2.

* This SOP supersedes SOP 1-2 dated 1 September 1971.

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TABLE I

TABLE OF CHI-SQUARED

(N-1) Degrees of Freedom	Probability						
	0.99	0.95	0.90	0.50	0.10	0.05	0.01
	Values of Chi-Squared						
2	0.020	0.103	0.211	1.386	4.605	5.991	9.210
3	0.115	0.352	0.584	2.366	6.251	7.815	11.345
4	0.297	0.711	1.064	3.357	7.779	9.488	13.277
5	0.554	1.145	1.610	4.351	9.236	11.070	15.086
6	0.872	1.635	2.204	5.348	10.645	12.592	16.812
7	1.239	2.167	2.833	6.346	12.017	14.067	18.475
8	1.646	2.733	3.490	7.344	13.362	15.507	20.090
9	2.088	3.325	4.168	8.343	14.684	16.919	21.666
10	2.558	3.940	4.865	9.342	15.987	18.307	23.209
11	3.053	4.575	5.578	10.341	17.275	19.675	24.725
12	3.571	5.226	6.304	11.340	18.549	21.026	26.217
13	4.107	5.892	7.042	12.340	19.812	22.362	27.688
14	4.660	6.571	7.790	13.339	21.064	23.685	29.141
15	5.229	7.261	8.547	14.339	22.307	24.996	30.578
16	5.812	7.962	9.312	15.338	23.542	26.296	32.000
17	6.408	8.672	10.085	16.338	24.769	27.587	33.409
18	7.015	9.390	10.865	17.338	25.989	28.869	34.805
19	7.633	10.117	11.651	18.338	27.204	30.144	36.191
20	8.260	10.851	12.443	19.337	28.412	31.410	37.566
21	8.897	11.591	13.240	20.337	29.615	32.671	38.932
22	9.542	12.338	14.041	21.337	30.813	33.924	40.289
23	10.196	13.091	14.848	22.337	32.007	35.172	41.638
24	10.856	13.848	15.659	23.337	33.196	36.415	42.980
25	11.524	14.611	16.473	24.337	34.382	37.382	44.314
26	12.198	15.379	17.292	25.336	35.563	38.885	45.642
27	12.879	16.151	18.114	26.336	36.741	40.113	46.963
28	13.565	16.928	18.939	27.336	37.916	41.337	48.278
29	14.256	17.708	19.768	28.336	39.087	42.557	49.588

The acceptable limits of probability are from 0.90 to 0.10. The number of determinations (N) is 20 and there is one restriction in this type of test; therefore, (N-1) = 19 degrees of freedom. From Table I, the acceptable value of χ^2 is a number between 11.651 and 27.204.

d. Quality-Control Charts (Figure 1)

(1) Purpose. The quality-control chart provides a guide for:

(a) Judging when and how much correction of instrument operation is required.

(b) Reducing tolerances when desirable.

(c) Anticipating or diagnosing faulty instrument behavior.

(2) Preparation. The quality-control chart will be prepared monthly after performance of the χ^2 test. The data derived from the χ^2 test will be used in the preparation of the plot in the following manner:

(a) Calculate the standard deviation (σ). For discussion see para 3a.

$$\sigma = \sqrt{\frac{\Sigma(\chi-\bar{\chi})^2}{N-1}}$$

(b) Multiply the σ by 1.645 (the 90% Confidence Factor)

(c) On a linear plot of cpm (vertical axis) vs time in days (1-31) draw a horizontal line midway on the vertical axis. Label this line with the numerical value of $\bar{\chi}$ determined on the χ^2 test.

(d) Above and below this line draw dotted lines. The distance from the solid line to the dotted line will be equal to the product of 1.645σ as determined in para 2d(2)(b) above.

(e) This is the quality-control chart. The solid line is the "true count rate" of the check source. The dotted lines above and below the solid line indicate the limits of acceptable statistical variations. If the counting system is performing satisfactorily, 90% of a statistically large number of one-minute counts of that check source should fall within the area bounded by the dotted lines.

(3) Use of the Quality-Control Chart. At the start of each counting day the check source should be counted for five one-minute counts. The Net Counts Per Minute (NCPM) obtained are then plotted on the quality control chart at the appropriate calendar date position. If the plotted

Figure 1
QUALITY-CONTROL CHART

CHI-SQUARED TEST
NaI(Tl) XTAL 4x4"
Date: 7 Jun 65
Geometry: Marinelli Beaker
Source: Cs-137

	X	$\bar{X}$	$(X-\bar{X})$	$(X-\bar{X})^2$*
1	6399	6369	30	900
2	6405		36	1296
3	6448		79	6241
4	6414		45	2025
5	6327		42	1764
6	6296		73	529
7	6180		189	62001
8	6424		55	3025
9	6438		69	4761
10	6339		30	900
11	6251		118	13924
12	6401		32	1024
13	6342		27	729
14	6544		175	30625
15	6365		4	16
16	6317		52	2704
17	6270		99	9801
18	6451		82	6724
19	6475		106	11236
20	6407		38	1444

$\Sigma(X-\bar{X})^2 = 161,669$

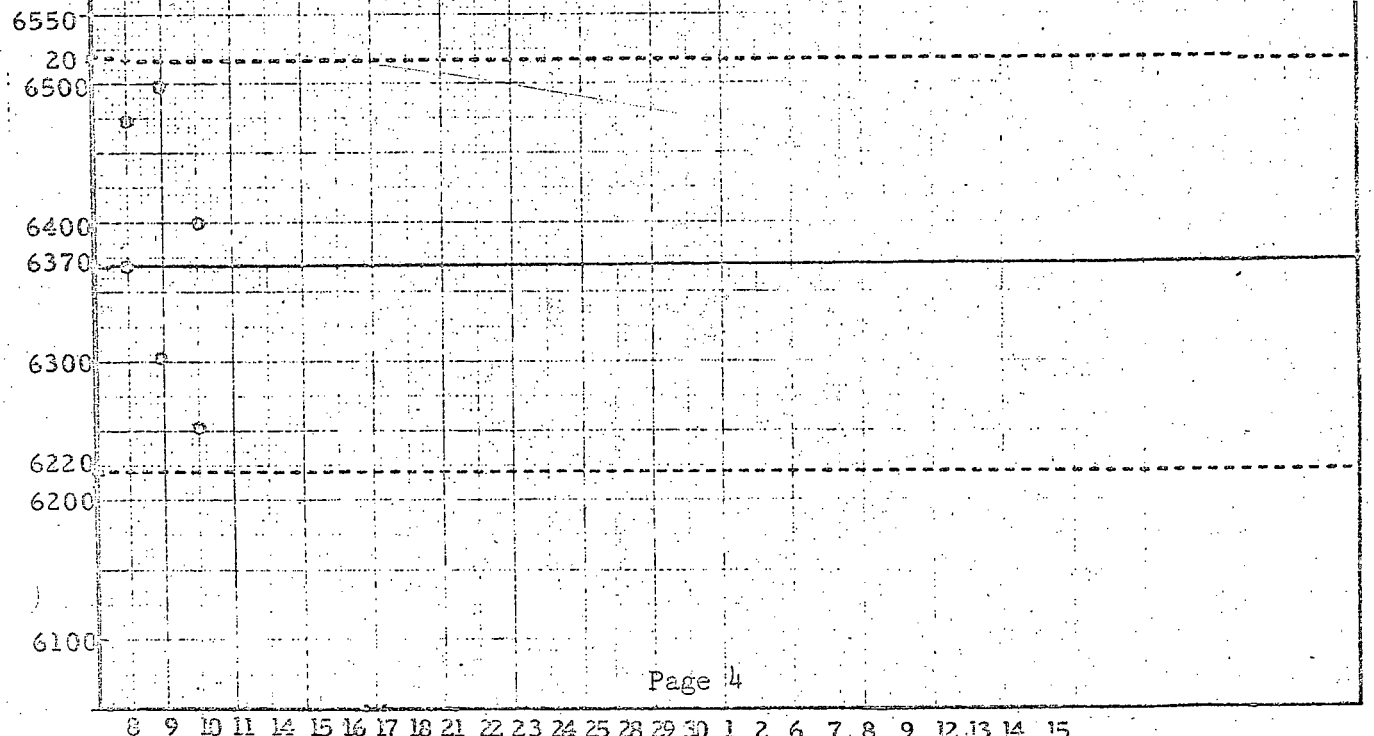
$$\chi^2 = \frac{161,669}{6369} = 25.4$$

$$\sigma = \sqrt{\frac{161,669}{19}} = 92.2 \text{ cpm}$$

σ at 90% CL = (1.645)(92.2) = ± 151.7cpm

Limits of
Performance = 6369 ± 152 cpm

* NOTE: Some desk calculators are designed to perform the squaring and summing functions in one operation. This eliminates the need to tabulate $(X-\bar{X})^2$



points are within the dotted lines the counting system is performing satisfactorily. If the plotted points are not within the dotted lines the instrument control settings should be examined for correctness. Possible causes of malfunctions which can be readily checked are shifts in operating voltages or gain, detector damage, line noise, large background increases, or an erratic timer, scaling strip, or register. The standard itself should be examined for wearing of the protective covering or leakage, which could cause increased or decreased counting levels, respectively. If the fault cannot be corrected, the instrument should be removed from routine operation until repaired. The quality-control chart should be continuously examined for indications of trends toward unacceptable operation so that potential malfunction of the instrument system or other sources of faults can be corrected as quickly as possible. Gradually decreasing counting may be caused by subtle degradation of the photomultiplier tube in scintillation systems. Each incurred fault and its method of correction should be noted on the quality-control chart; this will assist in analytical data evaluations or in the diagnosis of instrument malfunction.

3. Counting Precision.

a. Standard Deviation.

(1) The process of radioactive decay is a random phenomenon, the events being counted from a random sequence in time. Therefore, counting for a finite period of time can only yield an estimate (r) of the true, average counting rate ($\bar{r}$). The degree or measure of precision is directly related to the standard deviation (σ) as shown by the following table:

TABLE II

T_S	C_S	R_S	σ	%E
.01	100	10,000	1,000	10.0%
1.00	10,000	10,000	100	1.0%
100.00	1,000,000	10,000	10	0.1%

Where: T_S = Sample Counting Time (minutes)

C_S = Net Sample Counts

R_S = Net Sample Counts per Minute

σ = Standard Deviation $\left(\sqrt{\frac{R_S}{T_S}}\right)$

%E = Percent Error $\left(\frac{100\sigma}{R_S}\right)$

(2) An examination of the table shows that in the first instance the sample was counted for a very short time but (let us assume) the count rate

was found to be 10,000 cpm. Now; examine the last entry; here the sample was counted for a long time but still the count rate was found to be 10,000 cpm. The difference between the two examples is that the first measurement must be reported as 10,000 cpm ± 10% @ 68% Confidence Level (CL) - relatively approximate estimation; while the last entry may be reported as 10,000 cpm ± 0.1% @ 68% CL - a fairly exact measurement.

(3) For health physics purposes a 25% counting error is usually sufficiently accurate. The percent error and the Confidence Level used must always be reported. The Confidence Level is the standard deviation multiplied by a factor, for example:

0.675σ = 50% Confidence Level (CL)

1.000σ = 68% Confidence Level (CL)

1.645σ = 90% Confidence Level (CL)

1.960σ = 95% Confidence Level (CL)-Normally rounded-off to 2.000

3.000σ = 99.7% Confidence Level (CL)

Counting at Health Physics is usually done at the 2σ or 95% Confidence Level. Therefore, the last example cited in 3a(2) above would be reported as:

$$C_s \pm \frac{2\sigma}{C_s} (100) \text{ @ 95\% CL}$$

$$\text{or } 10{,}000 \text{ NCPM} \pm \frac{2(10)}{10{,}000} \text{ @ 95\% CL}$$

$$= 10{,}000 \text{ NCPM} \pm 0.2\% \text{ @ 95\% CL}$$

b. Minimum Detectable Activity.

(1) The Minimum Detectable Activity (MDA) is a function of the sensitivity of the counting system, the background count rate, the length of time available for counting the sample, and the counting precision desired. For the normal health physics survey evaluation a Counting Error of ±25% is acceptable. The sensitivity of the counting system is determined by the distance of the sample from the sensitive volume of the detector, the mounting materials used, the energy of the emitted radiation, and the quantity and type of absorbing materials between the sample being counted and the detector.

(2) The MDA is calculated at 3σ (99.7% CL) as follows:

$$\text{MDA} = 3\sqrt{\frac{R_b}{T_b}}$$

Where R_b = Background Counting Rate

T_b = Length of Count

3 = 99.7% CL

e.g. BG = 400 counts in 10 minutes or 40 cpm

then MDA $= 3\sqrt{\frac{40}{10}} = 3\sqrt{4} = 3(2) = 6$ cpm

Therefore; the MDA is 6 NCPM, or we are 99.7% confident that 6 NCPM represent real activity and are not due to a statistical fluctuation of the background counting rate.

(3) The value thus calculated is valid only for a sample counting time equal to the background counting time and is dependent upon the ability of the counting system to reproduce the background obtained.

c. High Count Rate Corrections.

(1) Every counting system has a finite upper limit on its counting rate capacity. At high count rates errors are encountered from coincidence loss, dead time, and resolution limitations.

(2) Determination of Dead Time (the length of time a counting system requires to process a single pulse during which interval the system is insensitive to additional pulses).

(a) A simple way to evaluate Dead Time (t) is by the "Split Source" method. Four counting rates are required:

1 R_b = Background Counting Rate (cpm)

2 R_1 = First Beta Source (Gross cpm)

3 R_2 = Second Beta Source (Gross cpm)

4 R_{1+2} = First and second Beta Sources counted together (Gross cpm)

Calculation:

$$t = \frac{R_1 + R_2 - R_{1+2} - R_b}{(R_{1+2})^2-(R_1)^2-(R_2)^2} = \underline{\text{Minutes}}.$$

(b) Direct determination of the dead time by use of an oscilliscope is recommeded when the equipment is available.

(3) The dead time value may be used to determine the True Counting Rate using the following formula:

$$R_s = \frac{r}{1-rt}$$

Where R_s = True Net Count Rate (NCPM)

r = Observed Net Count Rate (NCPM)

t = System Dead Time (minutes)

4. Calibration of Counting Systems.

a. General. After it has been determined that a counting system is performing satisfactorily, it must be calibrated. By calibration we mean the establishment of a fixed and known relationship between the output of the counting system and the identity and quantity of the sample being analyzed. This relationship is generally based on the careful measurement of a "certified standard" which may be defined as a radioactive sample that has been assayed by a reputable scientific or commercial organization.

b. Selection of Counting Standards. Normally, the following standards will be used for comparison with unidentified, mixed samples:

α-emission - ^{238}Uranium

β-emission (unidentified laboratory samples) - ^{14}C

β-emission (unidentified reactor samples) - ^{204}Tl

γ-emission - ^{137}Cesium

Note: The 0.662 Mev Gamma-Ray from ^{137}Cesium and the 0.77 Mev (Emax) Beta-particle emission from ^{204}Thallium are considered to be suitable for Mixed Fission Product calibration.

c. Comparative Counting. Comparing a sample disintegration rate to that of a known standard is only accurate when the geometries are identical and the count rates are similar.

5. Evaluation of Samples.

a. Known Identity.

(1) If the identity of the radionuclide is established and the counting efficiency has been determined with a certified standard of that radionuclide, the activity is simply determined by preparing, mounting, and counting the sample. The dpm is then calculated using the following relationship:

$$dpm = \frac{NCPM}{Eff}$$

NCPM = Net Counts Per Minute

Eff = Counting Efficiency of the System

(2) If the identity of the radionuclide is known but the counting efficiency has not been determined with a certified standard of that radionuclide, then an estimation of the activity may be obtained by use of a plot of Energy vs Efficiency that has been prepared for a specific counting instrument and counting geometry using calibrated sources. See Figure 2. The counting efficiency for a predetermined energy is read from the graph and the activity is then calculated using the relationship in 5a(1) above.

b. Unknown Identity.

(1) When the identity of the radionuclide(s) is unknown and the health physics evaluation requires identification for the establishment of adequate control, the sample should be analyzed by either gamma spectrometry, chemical separation, half-life determination, Feather Analysis, or a combination of these methods. When the analyses have been accomplished and the identity of the radionuclide has been established, the activity should be determined in accordance with the previous instructions.

(2) If adequate control or evaluation does not depend on identification of the radionuclides, an estimation of the activity may be based on the radioisotopes listed in para 4b above.

c. Wipe Counting - Single Samples. Normally wipes are counted for only one minute each. This however is dependent upon the MDA of the system for the radionuclide(s) under consideration and the current contamination levels. It may, therefore, be necessary to lengthen the counting time on occasion in order to obtain suitable counting statistics (see para 3).

d. Efficient Distribution of Counting Time.

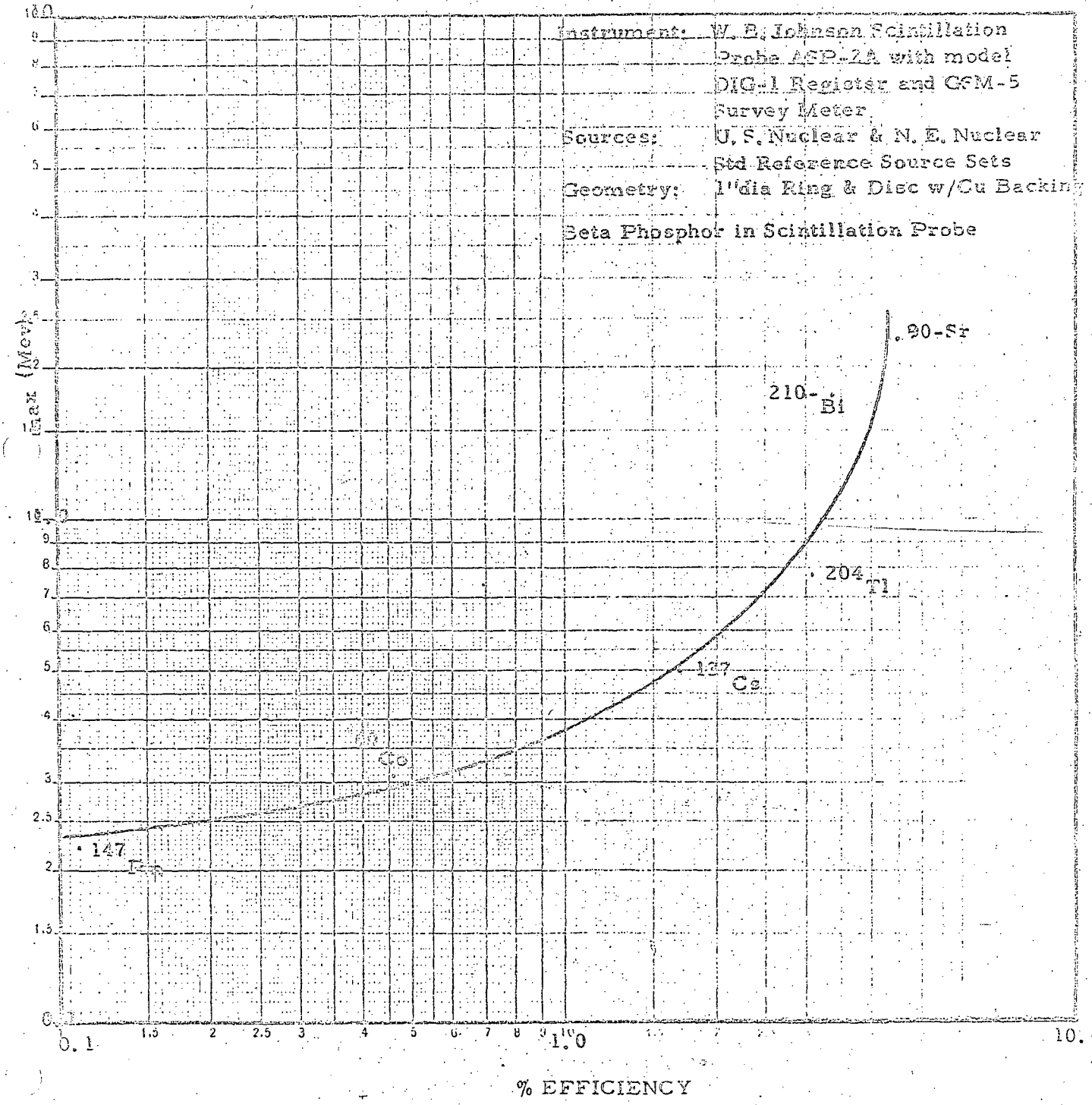
(1) When the activity of a sample is low compared to the background counting rate, it is advantageous to calculate the most efficient distribution of counting time between the sample activity and the background activity in order to minimize the counting error.

(2) It can be shown that for a particular time distribution, the counting error will be at a minimum. The time distribution is calculated as follows:

$$\frac{T_{b+s}}{T_b} = \sqrt{\frac{R_{b+s}}{R_b}}$$

Figure 2

MAXIMUM BETA ENERGY vs % EFFICIENCY



where T_{b+s} = Length of Sample plus Background Count in Minutes

T_b = Length of Background Count in Minutes

R_{b+s} = Gross Counting Rate of Sample plus Background

R_b = Background Counting Rate

e.g. Suppose a sample has an activity of 4,000 cpm and the background is 40 cpm; then

$$\frac{T_{s+b}}{T_b} = \sqrt{\frac{4000}{40}} = \sqrt{100} = 10$$

This means that for the most efficient distribution of counting time with minimum counting error for a given time, the sample should be counted for a time interval that is ten times that of the background determination.

6. Calculation of Activity. See the attached Appendix A for the methods and units employed to calculate the activity of samples analyzed by the Radioactivity Analysis Laboratory, Health Physics, WRAMC.

7. Statistical Analysis of Environmental Data.

a. All environmental sample data is subjected to standard statistical tests of significance. Chauvenet's Criterion is utilized to establish the acceptable deviation.

b. When the observed ratiation level of the environmental sample exceeds the base line environmental radiation level by more than the acceptable deviation as established by Chauvenet's Criterion, the sample is held for further evaluation and additional representative samples are obtained for analysis.

8. References.

a. Dixon and Massey, Introduction to Statistical Analysis, 1957

b. Jarrett, A.A., Statistical Methods Used in the Measurement of Radioactivity With Some Useful Graphs and Monographs, USAEC, 1946.

c. Loevinger, R. and Berman, M., Efficiency Criteria in Radioactivity Counting, 1951

d. Overman and Clark, Radioisotope Techniques, 1960

e. Chase and Rabinowitz, Principles of Radioisotope Methodology, 1964

f. Quimby and Feitelberg, Radioactive Isotopes in Medicine and Biology, 1963

g. NBS Handbook 80 - A Manual of Radioactivity Procedures, 1961

h. NBS Handbook 84 - Radiation Quantities and Units, 1962

i. NBS Handbook 86 - Radioactivity, 1963

j. PHS Publication 999-RH-15 - Quality Control of Radioactivity Counting Systems, 1965

k. NAS-NRC-Publication #573 - Measurements and Standards of Radioactivity, 1957

l. NBS-Circular-476 - Measurement of Radioactivity, 1949

APPENDIX A - Calculation Sheets

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APPENDIX A to
HP SOP 1-2 - Counting Procedures

10 June 1974

CALCULATION SHEETS

The mathematical symbols used in this Appendix are defined as follows:

SYMBOL	DEFINITION	UNITS
C	Activity Concentration	µCi/ml
R_s	Net Counting Rate of Sample	NCPM
R_b	Background Counting Rate of Counting System	cpm
R_{b+s}	Gross Counting Rate of Sample includes R_b	cpm
eff	Counting Efficiency for the Counting System	NCPM/dpm
V	Volume of Sample Counted	ml
t_{b+s}	Length of Gross Sample Count	min
t_b	Length of Background Count	min
Y	Chemical Recovery or Yield Factor	
%E	Percent Error	
σ	Standard Deviation	
dpm	Disintegrations per minute	
4.5×10^{-7}	Microcuries per Disintergration	µCi/dpm
µCi	Microcurie	10^{-6} Ci
2.22×10^{6}	Disintegrations per Microcurie	dpm/µCi
pCi	Picocuries	10^{-12} Ci
2.83×10^{4}	Cubic Centimeters per Cubic Foot	cc/ft^3
A	Sample Area in Square Meters	M^2
Nd	Interval of Exposure Time in Days	Days
Wt_s	Net Weight of Sample in Grams	g

SYMBOL	DEFINITION	UNITS
CL	Confidence Level	%
SA	Self Absorption Factor	
MDA	Minimum Detectable Activity	µCi or dpm

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Percent Error Calculation Sheet

$$* \quad \%\text{Error}(E) = \frac{2\sqrt{\frac{R_{b+s}}{t_{b+s}} + \frac{R_b}{t_b}}}{R_s} \times 100$$

Where:

$R_{b+s} = 3.08 \times 10^3$ cpm

$R_b = 7.65 \times 10^2$ cpm

$R_s = 2.32 \times 10^3$ NCPM

$t_{b+s} = 10$ minutes

$t_b = 10$ minutes

$$\therefore \%E = \frac{2\sqrt{\frac{3.08 \times 10^3}{10} + \frac{7.65 \times 10^2}{10}}}{2.32 \times 10^3} \times 100$$

$$= \frac{2(1.96 \times 10^1)}{2.32 \times 10^3} \times 100$$

$= 1.69\%$ @ 95% CL (Confidence Level)

* Note: Error is always calculated at the 95% Confidence Level (1.96 σ which is normally rounded-off to 2.000.)
Also, the expression $\sqrt{\frac{R_{b+s}}{t_{b+s}} + \frac{R_b}{t_b}}$ is another method of determining the Standard Deviation (σ), refer to 2d(2)(a) and 3a of the HP SOP 1-2.

Wipe Analysis for Removable Contamination

Calculation Sheet

$$dpm = \frac{NCPM}{eff}$$ for β and α samples

$$dpm = \frac{N\gamma PM}{eff}$$ for Integral γ Analysis of Samples - (Normally referenced to ^{137}Cs)

$$dpm = \frac{N\gamma PM_{PP}}{\gamma_q \, eff_\gamma}$$ for analysis of γ emitters whose identity has been determined

Where:

$N\gamma PM_{PP}$ ≡ Net Gamma Counts per Min Under photopeak area. (peak Channel ± 2 channels)

γ_q ≡ Gamma Abundance for the photopeak energy being measured.

eff_γ ≡ Counting efficiency of the System for Counting the γ channel energy range of the subject photopeak.

Activity Concentration Reported:

dpm per wipe normally referenced to ^{14}C for β ---- ^{137}Cs for γ and ^{210}Po for α

Note: The relationships shown will be used in many other activity determinations.

Low Level Net β+α Activity Determinations in Waste Water

Calculation Sheet

$$C = \frac{R_s (4.5 \times 10^{-7})}{(eff)(V)(Y)(SA)}$$

Where:

R_s = 1.85 NCPM @ 1540 hrs 11 Jul 66
R_b = 1.31 cpm
R_{s+b} = 3.16 cpm
t_{s+b} = 60 min
t_b = 120 min
eff = 0.235 NCPM/dpm (^{204}Tl)
SA = 0.843
Y = 0.85
V = 1×10^3 ml

$$\therefore C = \frac{(1.85 \text{ NCPM})(4.5 \times 10^{-7} \mu Ci/dpm)}{(0.235 \frac{\text{NCPM}}{dpm})(1 \times 10^3 ml)(0.843)(0.85)} = 4.92 \times 10^{-9} \mu Ci/ml$$

$$\%E = \frac{2\sqrt{\frac{3.16}{60} + \frac{1.31}{120}}}{1.85} \times 100 = 27.2\%$$

Activity Concentration Reported:

$4.92 \times 10^{-9} \mu Ci/ml \pm 27.2\%$ @ 95% C.L. @ 1540 hrs 11 Jul 66

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Waste And DORF Pool Water for Gamma Analysis

Calculation Sheet

$$C = \frac{R_s (4.5 \times 10^{-7})}{(eff \times V)}$$

Where:

$R_s = 2.32 \times 10^3$ NCPM @ 1340 hrs 14 Jul 66
$R_{bks} = 3.08 \times 10^3$ cpm
$R_b = 7.65 \times 10^2$ cpm
$t_{bks} = 10$ min
$t_b = 10$ min
$eff = 0.14$ NCPM / dpm (^{137}Cs)
$V = 2.5 \times 10^3$ ml

$$\therefore C = \frac{(2.32 \times 10^3 \text{ NCPM})(4.5 \times 10^{-7} \mu Ci/\text{dpm})}{(0.14 \text{ NCPM/dpm})(2.5 \times 10^3 \text{ ml})}$$

$$= 2.98 \times 10^{-6} \mu Ci/ml$$

$$\%E = \frac{2\sqrt{\frac{3.08 \times 10^3}{10} + \frac{7.65 \times 10^2}{10}}}{2.32 \times 10^3} \times 100$$

$$= \frac{2(1.96 \times 10^1)}{2.32 \times 10^3} \times 100 = 1.69\%$$

Activity Concentration Reported:

$2.98 \times 10^{-6} \mu Ci/ml \pm 1.69\%$ @ 95% CL @ 1340 hrs 14 Jul 66

*Note: The eff used is for ^{137}Cs in 2000 ml of H_2O
Counted Integrally over 0-3.0 MeV in a Marinelli Type Beaker on the 4"x4" NaI Xtal.

Gamma Analysis Of Flora Samples

Calculation Sheet

$$pCi/gm = \frac{(R_s)(4.5\times10^{-1})}{(eff)(Wt_s)}$$

Where: R_s = 8571 NCPM @ 1520 25May66
R_{s+b} = 9365 cpm
R_b = 794 cpm
t_{s+b} = 10 min
t_b = 10 min
eff = 0.132 NCPM/dpm (^{137}Cs)
Wt_s = 2×10^3 gm

$$pCi/gm = \frac{(8.571\times10^3\ NCPM)(4.5\times10^{-1}\ pCi/dpm)}{(0.132\ NCPM/dpm)(2\times10^3\ gm)}$$

$$= 14.6\ pCi/gm$$

$$\%E = \frac{2\sqrt{\frac{9365}{10}+\frac{794}{10}}}{8571}\times100 = 0.75\%$$

Activity Concentration Reported:

14.6 pCi/gm ± 0.75% @ 95% CL @ 1520 hrs 25May66
Determined by Integral γ Analysis (0-3.0 MeV)

MDSC-RS
SUBJECT: APP A to HP SOP 1-2

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Gamma Analysis Of Fallout-Washout Samples

Calculation Sheet

$$pCi/M^2/day = \frac{(R_s)(4.5\times10^{-1})}{(eff)(A)} \Big/ Nd$$

Where: R_s = 35.6 NCPM @ 1557 25 Jul 66
R_{s+b} = 777.8 cpm
R_b = 742.2 cpm
t_{s+b} = 10 min
t_b = 10 min
eff = 0.142 NCPM/dpm (^{137}Cs)
A = 0.06 M^2
Nd = 7 days

$$\therefore pCi/M^2/day = \frac{(35.6\ NCPM)(4.5\times10^{-1}\ pCi/dpm)}{(0.142\ \frac{NCPM}{dpm})(0.06\ M^2)} \Big/ 7\ days$$

$$= \frac{186\ pCi/M^2}{7\ days} = 26.9\ pCi/M^2/day$$

$$\%E = \frac{2\sqrt{\frac{777.8}{10}+\frac{742.2}{10}}}{35.6}\times100 = 69\%$$

Activity Concentration Reported:

26.9 pCi/M^2/day ± 69% @ 95% C.L. @ 1557 hrs 25 Jul 66
Determined by Integral & Analysis (0-3.0 MeV)

Gamma Analysis Of Soil Samples

Calculation Sheet

$$pCi/gm = \frac{(R_s)(4.5\times10^{-1})}{(eff)(Wt_s)}$$

Where: R_s = 505 NCPM 21 Mar 66
R_{s+b} = 1280 cpm
R_b = 775 cpm
t_{s+b} = 900 min
t_b = 900 min
eff = 0.144 NCPM/dpm (^{137}Cs)
Wt_s = 240.8 gms

$$pCi/gm = \frac{(5.05\times10^{2}\ NCPM)(0.45\ pCi/dpm)}{(0.144\ NCPM/dpm)(2.408\times10^{2}\ gm)}$$

$$= 4.47\ pCi/gm$$

$$\%E = \frac{2\sqrt{\frac{1280}{900}+\frac{775}{900}}}{505} \times 100 = 0.6\%$$

Activity Concentration Reported:

4.47 pCi/gm ± 0.6% @ 95% CL @ 21 Mar 66
Determined by Integral γ Analysis (0-3.0 MeV)

GAMMA Analysis of Air Particulate Monitor Samples

Calculation Sheet

$$\text{Volume @ } \begin{matrix}2100\text{ hrs}\\ 6\text{ Jul }66\end{matrix} = (12.92\text{ hrs})\left(\frac{60\text{ min}}{\text{hr}}\right)(9.2\text{ ft}^3/\text{min})\left(2.83\times10^4\ \frac{\text{cc}}{\text{ft}^3}\right)$$

$$= 2.02\times10^8\text{ cc}$$

Where: Filter "ON" @ 0805 hrs 6 Jul 66
Elapsed time to 2100 hrs 6 Jul 66 = 12.92 hrs
Flow Rate = 9.2 cfm

4.8×10^3 dpm @ 2100 hrs 6 Jul 66 (Mid-point of the Sampling Interval)

dpm

10^3

Time & Date of Count	MDA	Observed dpm
1500 hrs 7 Jul 66	144 dpm	1384 dpm
1000 hrs 8 Jul 66	142 dpm	362 dpm

$\therefore$ Activity @ 2100 hrs 6 Jul 66 =

$$(4.8\times10^3\text{ dpm})(4.5\times10^{-7}\ \mu\text{Ci/dpm})\left(\frac{1}{2.02\times10^8\text{ cc}}\right)$$

$$= 1.07\times10^{-11}\ \mu\text{Ci/cc}$$ JaB

Activity Concentration Reported:

$= 1.07\times10^{-11}\ \mu$Ci/cc @ 2100 hrs 6 Jul 66
Determined by Integral γ Analysis (0-3.0 MeV)

2100 hrs 6 Jul 66 | 2100 hrs 7 Jul 66 | 2100 hrs 8 Jul 66 | Elapsed Time

10 June 1974

Apparent Age of Fission Products

Environmental Studies

Way-Wigner Formula

Calculation Sheet

$$t_1 = \frac{\Delta t_1}{\left\{\left(\frac{A_1}{A_2}\right)^{0.835} - 1\right\}}$$

Where:

t_1 = days ≡ Apparent Age at the Time of First Counting

Δt_1 = 6.72 days ≡ Time elapsed between 1st & 2nd Counts

A_1 = 8571 NCPM ≡ Activity at time of First Counting (Approximately 3 days after Collection.)

A_2 = 5662 NCPM ≡ Activity at time of Second Counting (Approximately 10 days after Collection.)

$$\text{Days} = \frac{6.72}{\left\{\left(\frac{8571}{5662}\right)^{0.835} - 1\right\}} = \frac{6.72}{1.413 - 1} = 16.3 \text{ days}$$

Time from first Count to detonation = 16.3 days

Time and date of First Count = 1520 hrs 25 May 66

Announced time of Chinese Test ≅ 9 May 66

Calculated time and date of Test ≅ 0800 9 May 66 (edt)

Fission-Product Activity at Time of Collection
Environmental Studies

Calculation Sheet

Collected: 1515 hrs 25 May 66
1st Count: 0830 hrs 1 Jun 66

$$A_c = A_1\left(\frac{t_1}{t_1 - \Delta t_2}\right)^{1.2}$$

Where:

$\Delta t_2 = 6.7$ days ≡ Time elapsed between Collection and first Counting

$A_1 = 9.65$ pCi/gm ≡ Activity at time of 1st Count

$t_1 = 23.0$ days ≡ Apparent Age of Fission-Products at time of 1st Counting (Way-Wigner)

$A_c =$ pCi/gm ≡ Activity at time of Collection

$$\frac{pCi}{gm}@\ \substack{1515\text{ hrs}\\25\text{ May }66} = 9.65\left(\frac{23.0}{23.0-6.7}\right)^{1.2} = 9.65(1.51) = 14.6\ \frac{pCi}{gm}$$

$$\%E = \frac{2\sqrt{\frac{6456}{10}+\frac{794}{10}}}{5662} \times 100 = 0.95\%$$

Where: $R_s = 5662$ NCPM @ 0830 hrs 1 Jun 66

$R_{s+b} = 6456$ cpm $\quad t_{s+b} = 10$ min

$R_b = 794$ cpm $\quad t_b = 10$ min

Activity Concentration Reported:

14.6 pCi/gm ± 0.95% @ 95% C.L. @ 1515 hrs 25 May 66
Determined by Integral γ Analysis (0-3.0 MeV)

10 June 1974

Determination of Fission-Product Activity
Environmental Studies
(Koval Method)

Calculation Sheet

$$C_{LL} = \frac{C_2 - C_1 e^{-\lambda \Delta t}}{1 - e^{-\lambda \Delta t}}$$

Where:

C_{LL} = pCi ≡ Gross Long Lived Activity

C_1 = 202 pCi ≡ Activity Observed at time t (Approximately 4 hrs after Collection)

C_2 = 108 pCi ≡ Activity Observed at time t_2 (Approximately 24 hrs after C_1)

t = 1430 hrs 25 May 66 ≡ Date and time at which C_1 was measured

t_2 = 0900 hrs 26 May 66 ≡ Date and time at which C_2 was measured

Δt = 18.5 hrs ≡ Elapsed time between C_1 and C_2.

λ = 0.0654 ≡ Decay Constant for Thorium B (^{212}Pb) = 0.693/10.6 hrs

$$\therefore pCi = \frac{108 - 202e^{-(0.0654)(18.5)}}{1 - e^{-(0.0654)(18.5)}}$$

$$= \frac{1.08 - 202e^{-1.21}}{1 - e^{-1.21}} = \frac{47.8}{.702} = 68\ pCi$$

Volume of air collected = 167 M^3

∴ The Concentration of Long Lived Nuclides in Air at 1430 hrs 25 May 66 = 68 pCi/167 M^3 = 0.41 pCi/M^3

or 4.1×10^{-13} μCi/cc

Note: Determination of this activity was made by Integral γ Analysis (0-3.0 MeV). The activity is a result of the Chinese Test on 9 May 1966

HEALTH PHYSICS
WALTER REED ARMY MEDICAL CENTER
Washington, D.C. 20012

*
MEDEC-YHP
SOP
Number 2-2

10 June 1974

RADIOACTIVITY ANALYSIS LABORATORY

1. Purpose. To establish guidelines for the radioactivity analysis laboratory (R/A Lab), Health Physics (HP), Walter Reed Army Medical Center (WRAMC) in order to insure the orderly and continuous operation of the laboratory.

2. Mission. To assist the Chief, Nuclear Laboratory and Technical Service Branch (Ch, NL&TS Br), HP, WRAMC, in the successful fulfillment of the overall mission of the Branch by providing the necessary technical and administrative ability to determine the identity and quantity of radioactivity in environmental samples, wipe tests, reactor effluents, reactor pool water, and other special analyses as required.

3. Routine Duties.

a. General. Routinely the Ch, R/A Lab, will evaluate and report sample analyses directly to the requestor. However, when analyses indicate abnormal samples or contamination levels, he will consult with the Ch, NL&TS Br, prior to making a final report to the requestor.

b. Daily Calibration of Counting Equipment. All calibrations, background measurements, malfunctions and repairs will be entered into the Daily Performance Log. Calibration sources and backgrounds will be counted daily on routinely used equipment. All routinely used equipment will normally be left in the operating mode to insure its stability and reliability.

(1) NS 4096 Channel Analyzer. See manufacturer's literature for operating instructions.

(a) The integral gamma efficiencies for routine geometrics are arrived at from the 137-Cesium point source efficiency using an empirically determined correlation factor.

(b) Energy calibration - 0-2 MEV full range

(c) Performance check.

(2) Beckman Liquid Scintillation System. See manufacturer's literature for operating instructions.

*This SOP supersedes HP SOP Number 2-2, 10 September 1972.

(a) This instrument is normally calibrated by running a set of quenched standards and plotting the calculated efficiencies against the automatic quench correction (AQC) factor, (the decimal value following the χ on the printout).

(b) Efficiency for each sample is determined by going to the calibration curve for that type of sample and taking the efficiency as that point where the AQC factor intercepts the efficiency curve.

(3) Beckman WIDEBETA II, Beta Counting System. See literature for operating instructions.

(a) Net beta efficiency is calibrated from a 14-Carbon standard.

(b) Alpha efficiency is calculated from a 210-Polonium standard.

(4) 1600 Channel Multi-parameter Analyzer. See manufacturer's literature for operating instructions.

(a) This instrument will be interchanged between several different detector systems depending upon the laboratory's needs.

(b) Calibration of this instrument will be done at the time of sample counting. Calibration will be done with whatever isotopes are necessary to give the laboratory a reference as to the energy, activity, etc., of the sample under consideration.

(5) LCRM-22R Air Particulate Monitor. See manufacturer's literature for operating instructions.

(a) Change the filter paper each duty day at approximately 0900 hours. Prepare a WRAMC Form 708 (Health Physics Survey Work Copy) for the filter removed. Stamp the chart on the LCRM-22R and the WRAMC Form 708 with the rubber stamp provided and fill in the required data; time, date, weather, etc.

(b) Make a visual inspection of the indicators to assure proper operation.

(c) For calibration, see ANNEX B to this SOP.

c. Periodic Calibration (Determined by Chief, NL&TS Br)

(1) CHI Squared (χ^2) statistical evaluation of each laboratory instrument in daily use for nuclear counting purposes.

(2) Determination of the resolution of the 4x4" Sodium Iodide crystal and phototube assembly (4x4" NaI Xtal).

d. Voltage plateaus and χ^2 statistical evaluations will be performed as required, and after equipment repairs or component changes.

4. Laboratory Procedures and Work Load.

a. General.

(1) For convenience, 10 minute counting times are specified throughout these procedures; however, in cases where a low sample-to-background ratio exists and a small counting error is necessary, the counting time will be extended to insure statistical validity of the radioassay.

(2) Abnormal as used in these procedures is defined as any sample exceeding the radiation protection guidelines (RPG) and/or contamination levels or that has a gamma spectrum with a statistically significant photopeak(s) that has not been previously identified and whose origin has not been explained to the satisfaction of the Chief, NL&TS Br, HP, WRAMC.

b. Daily Samples.

(1) DORF Pool Water

(a) Action. Allow sample to decay for approximately 24 hours after collection to allow the 41-Argon to decay away, thus eliminating its interference in the detection of low levels of fission products.

1 Do a 10-minute integral gamma count on a Marinelli beaker with one empty plastic bag inserted to establish the background counting rate of the 4x4" NaI Xtal.

2 Do a 10-minute integral gamma count of 2500 ml aliquot of the sample.

3 Prepare an X-Y plot on all abnormal samples.

(b) Calculations - See HP SOP 1-2, Counting Procedures.

(c) Follow-up - Next day.

1 Do a 10-minute integral gamma count of the sample if required for decay purposes.

2 Prepare an X-Y plot of the gamma spectrum.

(d) Disposition of Sample - Discard the sample to the sewer

after the activity decays to approximately 10^{-6}µCi/ml, making the appropriate entries in the Waste Disposal Log.

(2) Air Particulate Monitor - Reactor Air Samples.

(a) Immediate Action

1 Do a 10-minute integral gamma count on the 4x4" NaI Xtal with the 1/4" lucite beta absorber in place to establish the background counting rate.

2 Do a 10-minute integral gamma count of each filter at least five (5) hours after sample cut-off (to allow for decay of short-lived Radon components).

3 Prepare an X-Y plot on all abnormal samples.

(b) Calculations - See HP SOP 1-2, Counting Procedures.

(c) Follow-up - Next day.

1 Do a 10-minute integral gamma count on the 4x4" NaI Xtal with the 1/4" lucite beta absorber in place to establish the background counting rate.

2 Do a 10-minute integral gamma count of each filter at least 24 hours after sample cut-off (to allow for decay of long-lived Thoron components).

3 Prepare X-Y plots only in cases where further analyses are indicated.

(d) Disposition of Samples

1 Routine Samples - Discard the samples after analysis.

2 Abnormal Samples - Discard the samples only after completion of analysis in accordance with current procedures.

(3) Air Particulate Monitor - LCRM-22R (2" Filter Disc).

(a) This sample is collected for use as a background comparison in the evaluation of reactor air samples.

(b) Procedure same as (2)(b) above with the exception that the 3/4"x4" diameter lead shield is placed on top of the flat filter disc for all counting.

(c) Calculations - See HP SOP 1-2, Counting Procedures.

(d) Disposition of Samples - Same as (2)(d) above.

(4) Wipes

(a) Immediate Action

1 Beta contamination suspected

a Select a calibration standard in the energy range of the suspect isotope and determine the counting efficiency (See HP SOP 1-2, Counting Procedures, para 4b).

b Set the wipes up for WIDEBETA II system. Initiate 10-minute counts on samples.

c If contamination is noted on any wipe, remove it from its planchet, place it in a paper envelope, and count it on the 4x4" NaI Xtal to determine the amount of gamma activity present and its identity if it is a gamma emitter. Wipes are counted with the 3/4"x4" diameter lead shield on top of the wipe.

2 Gamma contamination suspected - Proceed as in c above.

3 Alpha contamination suspected - Adjust the counting mode to Alpha Mode (WIDEBETA II).

(b) Calculations - See HP SOP 1-2, Counting Procedures.

(c) Follow up

1 Notify the requestor by telephone of any wipes found to be of greater activity than the contamination level, giving the activity (in dpm) and identity of the contaminating isotope, if known.

2 Prepare X-Y plots of the gamma spectrum only if a further analysis is indicated or if they have been requested on the WRAMC Form 708.

(d) Disposition of Sample

1 Discard all noncontaminated wipes.

2 Hold the contaminated wipes until a report is made to the requestor, then discard them in accordance with current procedures.

(5) Special Samples - From time to time, special samples will be received for evaluation. These will be treated in accordance with HP SOP 1-2, Counting Procedures, and with the priority determined by the Chief, NL&TS Br, HP, WRAMC.

c. Samples Collected

(1) Fallout-washout Samples (collected twice monthly,i.e., at intervals of not less than 13 days, but not to exceed 18 days).

(a) Immediate Action

1 Do a 10-minute integral gamma count on a fallout collector with one (1) liter of deionized water in a plastic bag to establish the background counting rate.

2 Counting will be performed and X-Y plots prepared in accordance with ANNEX C to this SOP.

(b) Calculations - See HP SOP 1-2, Counting Procedures.

(c) Follow-up. Samples with unusual spectra or those having activities above 600 dpm will be retained for detailed analysis and identification.

(d) Disposition of Samples

1 All normal samples will be discarded into the sanitary sewer system.

2 Abnormal samples will be discarded in accordance with current procedures upon completion of the analyses.

(2) Reactor Effluent Water Samples (collected as required for analysis prior to release to the unrestricted area).

(a) Immediate Action

1 Do a 10-minute integral gamma count on each sample. A Marinelli beaker with one plastic bag inserted will be counted for 10 minutes to establish the background counting rate on the 4x4" NaI Xtal. A background will be required for each sample analyzed.

2 Do a 10-minute integral gamma count of total sample minus one (1) liter (for reduction in accordance with ANNEX A to this SOP, an evaluation of the remaining volume is usually between 1500 and 1800 ml).

3 Prepare an X-Y plot on all abnormal samples.

4 Proceed with preparation of the one (1) liter aliquot of each sample for a net analysis (see ANNEX A to this SOP). Counting time should be sufficient to provide a counting error not greater than 25% at the 95% confidence level when assaying samples with an activity greater than 1 x 10 mCi/ml.

(b) Calculations - See HP SOP 1-2, Counting Procedures.

(c) Follow-up. Abnormal samples will be analyzed in detail for determination of the half-life and identification of the nuclides present.

(d) Disposition of Samples. Discard to sewer (liquid samples) or non-burnable waste (solid samples) when analysis is completed in accordance with current procedures.

(3) Gas Samples (collected as required by the Health Physics Officer, WRAMC, or the Physicist in Charge, DORF.

(a) Immediate Action

1 Do a 10-minute integral gamma count of an empty sample container to establish the background counting rate on the 4x4" NaI Xtal with the 1/4" lucite beta absorber in place.

2 Perform a 10-minute integral gamma count on each sample.

(b) Calculations - See HP SOP 1-2, Counting Procedures.

(c) Follow-up. Abnormal samples will be analyzed in detail for identification of all nuclides present.

(d) Disposition of Samples. As most samples of this type will be short-lived, samples will be held for decay.

(4) Soil Samples (collected twice annually).

(a) Immediate Action

1 Do a 10-minute integral gamma count of an empty sample container to establish the background counting rate on the 4x4" NaI Xtal with the 1/4" lucite beta absorber in place.

2 Perform a 10-minute integral gamma count on each sample.

3 Prepare an X-Y plot on each sample.

(b) Calculations - See HP SOP 1-2, Counting Procedures.

(c) Follow-up. Abnormal samples will be analyzed in detail for determination of the half-life and identification of the nuclides present.

(d) Disposition of Samples. Discard all samples to waste upon completion of analyses.

(5) Flora Samples - Grass Cuttings (collected as required by the Chief, NL&TS Br, HP, WRAMC).

(a) Immediate Action

1 Do a 10-minute integral gamma background count on the 4x4" NaI Xtal with the 1/4" lucite beta shield in place.

2 Do a 10-minute integral gamma count on each sample.

3 Prepare an X-Y plot of each sample.

(b) Calculations - See HP SOP 1-2, Counting Procedures.

(c) Follow-up. Abnormal samples will be analyzed in detail for determination of the half-life and identification of the nuclides present.

(d) Disposition of Samples. Discard all samples upon completion of analyses.

(6) Snow Samples (collected as required by the Chief, NL&TS Br, HP, WRAMC). Thaw and treat as in para 4c(1) above.

5. Radiochemistry The Chief, R/A Lab, will, as required

a. Prepare calibration standards for use in the laboratory.

b. Perform necessary radiochemical separations using appropriate technical and laboratory procedures on file at HP, WRAMC.

c. Continuously evaluate and improve the laboratory techniques in keeping with technical advances made in the field.

6. Maintenance of Supplies and Equipment. The Chief, R/A Lab, will

a. Order chemicals and laboratory equipment needed through HP Supply.

b. Coordinate equipment maintenance with the HP Instrument Shop. All radiation detection instruments require a quarterly maintenance check.

c. Perform the following preventive maintenance:

(1) LCRM-22R - Grease and check oil level monthly.

(2) Fume hood blower shaft - Grease as required.

(3) Air compressor - Maintain oil level.

(4) Vacuum pump - Maintain oil level.

(5) Change fume hood prefilter semiannually.

(6) Tally Tape and Tape Reader - Maintain proper oil level and lubricate as required by the respective maintenance manuals.

d. Maintain inventory of radiochemicals in the safe in HP Supply Room.

e. Maintain inventory of assigned equipment.

7. Records. The Chief, R/A Lab, will insure that the following records are properly maintained:

a. Logs

(1) Sample Data Log - All incoming samples will be recorded and assigned a number in sequence from this Log. A new series of numbers will be started at the beginning of each calendar year.

(2) Waste Disposal Log - Record the discharge of liquid radioactive materials to the sewer.

(3) Daily Performance Log - A record of daily check, calibration, voltage plateaus, maintenance and observations of malfunctions for the laboratory counting instrumentation will be kept.

b. Files

(1) Reports of Special Laboratory Analyses for Reference - Papers on specific projects which will be useful as reference sources will be kept.

(2) Technical Data - Books and papers pertaining to laboratory operations and assigned equipment will be kept.

(3) Manufacturer's Data - Instructional material on the use and maintenance of the laboratory equipment will be maintained.

(4) Environmental Monitoring Data

(a) Folder for completed WRAMC Forms 708 (Health Physics Survey Work Sheet) for Bldgs 188 and 149-A will be kept (COFF 1 yr).

(b) Folder for Background Air Activity - WRAMC Form 708 for the daily evaluation of the LCRM-22R filters will be kept (COFF 1 yr).

(c) Folder for Fallout Analysis - WRAMC Forms 708 for the Fallout-washout Sample evaluation.

(d) Folder for Special Analyses (COFF 1 yr).

(5) Maintaining Register - Data pertinent to the laboratory counting instrumentation that is not suitable for entry into the Daily Performance Log will be kept and maintained as a permanent history of the equipment.

(6) Calibration Source Data Sheets - Radiochemical Standards - Data pertaining to the preparation and use of radiochemicals will be kept but will be cut off when the isotope is depleted or discarded.

c. Chemical Inventory - 3"x5" Card File. Record receipt and use of chemical stores to maintain a constant inventory of these supplies.

8. Reports. The Chief, R/A Lab will insure that the Reports of Analysis (WRAMC Forms 708) are completed and forwarded to proper authorities without delay.

(1) Reports for non-routine analyses will be prepared and forwarded as directed by the Chief, NL&TS Br, HP, WRAMC.

(2) A sample number is assigned to each sample and appropriate entries are made into the Sample Data Log. This number will then accompany the sample throughout its evaluation in the laboratory. The time and date of sample receipt will be stamped on all copies of the Form 708.

Claude M. Wiblin

CLAUDE M. WIBLIN
1LT, MSC
Asst. Health Physics Officer
WRAMC

ANNEX A to
HP SOP 2-2

10 June 1974

SAMPLE PREPARATION
NET $\beta + \alpha$ ACTIVITY IN WATER

1. Purpose. The purpose of this ANNEX is to provide a standard method for the preparation of water samples received at the R/A Lab, HPO, WRAMC, for Net $\beta + \alpha$ radioanalysis.

2. Responsibility. The Chief, R/A Lab will insure that all samples are processed for analysis without delay and provide a report of this analysis as quickly as possible to the requestor.

3. Water Samples - Net $\beta + \alpha$ Analysis Requested.

a. Agitate the sample and decant a one (1) liter aliquot from the total volume of the sample received.

b. Filter this aliquot through a strip of FINE quality filter paper on the "FILTER-FUGE" filtering apparatus; repeat as necessary to obtain a clear liquid.

c. Carefully remove the filter paper strip(s), place them into a porcelain crucible and allow to dry.

d. Carefully pour the clean filtrate into a clean water concentrator lightly greased with DOW-CORNING II silicon compound. Remove the paper tab from the planchet in the bottom of the concentrator before adding the sample.

e. Adjust the VARIAC for 85 volts, place the switch in the ON position and leave until the sample is evaporated.

f. When the sample is dried and cool, remove the planchet from the concentrator and place it in a 2"x 1/4" wall stainless steel planchet.

g. Place the crucible with the filter strip(s) in the fume hood, saturate the paper strip(s) with ACETONE, and IGNITE it (them). Repeat as necessary to completely reduce the paper strip(s) to an ash.

h. Using small amounts of Nitric Acid and deionized water, quantitatively transfer the ash to the planchet (f, above) and dry under a heat lamp or on a hot plate.

i. When the sample is dried and cool, it is ready for counting on the Beckman WIDEBETA II counting system.

ANNEX B to
HP SOP 2-2 10 June 1974

CALIBRATION OF LCRM-22R

1. Purpose. The purpose of this ANNEX is to provide a calibration procedure for the LCRM-22R Air Particulate Monitor.

2. Responsibility. The Chief, R/A Lab, HPO, WRAMC, will insure that the LCRM-22R is calibrated as required by the Chief, NL&TS Br, HPO, WRAMC.

3. Procedure.

a. A pulse generator with a pulse amplitude of 0 - 5.0 volts negative, a pulse width of 1.0 to 10.0 microseconds, and an accurate repetition rate is used in calibrating the LCRM-22R. Pulse width of the signal is not important as long as it remains within the above range. Both channels are driven simultaneously from the pulse generator through a 0.01 mfd capacitor to each signal injection point (green tip jack) on the LCRM-22Rchassis. Rotate both selector switches on the panel to the extreme counter-clockwise position (one position to the left of "test"). This is an unmarked position and disconnects the CRM inputs from any signal source except the green pin jacks.

b. Set the pulse generator for 50,000 CPM and 0.5 volts amplitude. Using an insulated screwdriver, adjust the sensitivity control of both channels for marginal triggering.

c. Reset pulse generator to 50 CPM and 4.0 volts amplitude. Set the LOW adjust pots on both channels until the recorder reads 53 CPM on both channels.

d. Set pulse generator to 50,000 CPM and leave the output amplitude at 4.0 volts for the remainder of the calibration procedure. Adjust the HIGH pots until the recorder reads 44,000 CPM on both channels.

e. Now, check the recorder readings of both channels at 5000 CPM and 500 CPM. Typical readings are 5200 CPM at 5000 CPM and 450 CPM at 500 CPM. The recorder and meter scales are logarithmic, but the electronic circuits are not truly logarithmic. In the interest of simple and reliable circuitry, this method was used in preference to the more complicated truly log circuit, since accuracy is not of prime importance, but reliability is important for monitoring applications. Thus, the circuit is adjusted as close as possible to the log scale of the recorder. After the initial calibration, minor adjustments usually have to be made again at the LOW and HIGH ends in order to obtain the best match between circuit and scale.

f. Remove the pulse generator leads from the green pin jacks and rotate both selector switches to "test". In this position of 60-Hz test, pulse is applied to the input of each CRM to give 3600 CPM. The actual recorder reading, under test signal conditions, will be somewhere between 3600 and 4000 CPM. If low counting or double counting is experienced in the "test" position, adjust the 8 - 50 mmfd trimmer capacitors, mounted on each selector switch, until the correct counting rate is obtained.

g. Plug signal generator leads, through 0.01 mfd capacitors, into the green pin jacks. Set the output pulse amplitude to 4.0 volts and 5000 CPM.

h. Allow enough time for the ratio circuit to come to equilibrium. Using an insulated screwdriver, adjust the LOW potentiometer until the recorder reads 1.0. This corresponds to the 1 K position on the chart paper.

i. Check the 1.0 reading at the 50,000 CPM, 50 CPM, and 500 CPM points. If a deviation in scale reading of more than 0.8 to 1.2 is found throughout the scale range, then additional steps in calibration must be taken to bring the deviation within the 0.8 to 1.2 tolerance allowed. On leaving the factory, the LCRM-22R is well within the above deviation, and need only be recalibrated for deviation, in the event that replacement of one or both 6005 tubes becomes necessary. These may vary somewhat in characteristics with the originals. This additional calibration is covered in para k, below.

j. Assuming that the 1:1 ratio is within tolerance, set the pulse generator for 50,000 CPM. Remove the test signal from channel 1 only, and rotate channel 1 selector switch to 3600 CPM or "test" position. Again, allow sufficient time for the ratio circuit to come to equilibrium. The ratio should show the actual ratio of channel 2 to channel 1 as indicated on the recorder. For example, if channel 2 shows 40,000 CPM and channel 1 shows 4,000 CPM, then the recorded ratio should indicate 10. The HIGH ratio adjust potentiometer is used to make this adjustment. Since the LOW and HIGH ratio adjustments are interactive to some extent, this procedure should be repeated at least twice to insure correct operation.

k. In the event that one or both 6005 tubes need to be replaced, it is quite possible that the ratio will not remain 1:1 when both channels are fed the same signal from 50 CPM to 50,000 CPM. This action results from the 6005 tube characteristics not being exactly the same. To correct this situation, perform the operations described in para a through i, above. If the ratio tends to increase in going from 50 CPM to 50,000 CPM, then the pulse width of the 5963 discriminator coupled to the 6005 of channel 2 is too wide, and needs to be decreased. If the ratio decreases, then this same pulse width is too narrow, and needs to be increased. The pulse width may be increased or decreased by adjusting a 5,000 ohm potentiometer located on the printed wiring side of the CRM card near each input end. There is one for each channel. Clockwise rotation increases the pulse width and counterclockwise rotation decreases the pulse width. This operation should be performed on only one channel at a time. If the desired effect cannot be made by adjusting channel 2, then the same procedure may be applied to channel 1. However, the pulse width adjustments on channel 1 produce the opposite effect on the ratio of the effects produced by pulse width adjustments made on channel 2.

l. After the pulse width adjustments have been finalized and the ratio stays within the prescribed limits, repeat para a - f and para j, above.

COLLECTION AND EVALUATION OF ENVIRONMENTAL MONITORING SAMPLES

1. Purpose. The purpose of this ANNEX is to describe the methods used in collecting, handling, and evaluating environmental monitoring samples relative to operation of the DORF reactor facility.

2. Responsibility. The Chief, R/A Lab, will insure that the requirements of the WRAMC ENRADMON Plan are met with regard to proper collection, handling, and evaluation of environmental monitoring samples.

3. Location of Fallout-washout Collecting Stations:

Station #	Location
1	Forest Glen - Two meters outside DORF fence on the South side.
2	Forest Glen - 50 meters from DORF on the left side of the DORF access road.
3	Forest Glen - 25 meters North of the Northwest corner of Bldg 119.
4	Forest Glen - East front of Bldg 188 near Linden Lane.
5	Main Post - Roof of Out-patient Bldg, Southwest corner.

4. Collection Frequency. Twice monthly, with a period between successive collections of at least 13 days, but not more than 18 days.

5. Preparation of Collector. One liter of tap water is added to a plastic pan (12"x8"x4") for the purpose of providing a collecting surface. (NOTE: During the months when freezing weather is anticipated, a mixture of 1 part permanent antifreeze to 2 parts tap water will be used.) The pans are assembled by the HP vehicle operator in Bldg 188, covered, and placed in the carrier provided for that purpose.

6. Collection. The sample carrier is loaded onto the Health Physics truck and the newly-prepared sample collectors are set out by the driver as replacements for those in place. The samples being returned to the R/A Lab for evaluation will be poured into a plastic bag which is sealed and placed in the pan from which the sample was poured.

7. Sample Evaluation.

a. The sample will be allowed to decay and come to ambient temperature for at least one day prior to analysis.

b. A one (1) liter sample of deionized water is placed in a plastic bag in a sample collector pan. The pan is then placed into the pan positioner and a 10-minute integral gamma count is made to establish the background.

c. Each sample is counted for 10 minutes in the same geometry as that used in para b, above, and an X-Y plot is prepared for the sample which has the highest activity.

d. All samples with a gamma activity in excess of 600 dpm (referenced to 137-Cesium) will be retained for detailed analysis, and will be reported to the Chief, NL&TS Br, HPO, WRAMC.

e. 600 dpm is based upon the current definition of radioactive contamination levels (100 dpm/100 cm^2). The effective collecting area of the plastic pan is 600 cm^2, so

$$\frac{100 \text{ dpm}}{100 \text{ cm}^2} \quad \frac{600 \text{ dpm}}{600 \text{ cm}^2}$$

8. Records and Reports.

a. All records will be maintained in the R/A Lab on WRAMC Form 708, to which appropriate X-Y plots will be affixed.

b. All environmental monitoring records will be maintained as permanent records in accordance with AR 340-18-6 and the current WRAMC Form 110.

c. The Chief, R/A Lab, will report all non-routine analyses to the Chief, NL&TS Br, for necessary action and/or information.

d. Non-routine samples are those fallout samples with an integral gamma activity in excess of 600 dpm or any sample in which fission products are suspected to be present.

HEALTH PHYSICS
WALTER REED ARMY MEDICAL CENTER
Washington, D. C. 20012

MEMO
*Number 14

10 June 1974

GAS CHROMATOGRAPH OPERATING PROCEDURES

1. Purpose. To outline routine and emergency operating procedures for use with chromatography detectors equipped with radioactive sources.

2. Scope. This SOP applies to all persons occupying the area designated for use of gas chromatograph detectors.

3. Responsibilities.

a. The Gas Chromatograph detector shall be used only by, or under the supervision of the Principal User. The Principal User is responsible for:

(1) Control, safe operation, and security of the Gas Chromatograph Unit.

(2) Training selected individuals in its safe use and operation in accordance with the procedures outlined herein.

(3) Insuring that WRAMC Regulation 40-10 and other pertinent documents are available at all times and are complied with.

(4) Promptly reporting any accident that could result in an unsafe condition to the WRAMC Health Physics Officer (Ext. 5107).

b. WRAMC Health Physics is responsible for:

(1) Conducting routine radiation protection surveys, periodic inspections and leak tests.

(2) Providing personnel dosimetry for all personnel as needed.

(3) Providing routine bioassay studies as needed.

(4) Instructing operating personnel in the Health Physics aspects of gas chromatography.

c. Individual Operators are responsible for:

(1) Operating the unit in a safe manner at all times.

(2) Being familiar with the contents of these instructions, WRAMC Regulation 40-10, and other data as prescribed by the Principal User.

*This MEMO supersedes MEMO 14, dated 12 May 1971.

(3) Reporting all accidents or abnormal operating conditions that could result in an unsafe condition or exposure of personnel promptly to the Principal User.

4. Emergency Procedures.

a. In the event of an emergency, the following individuals will be notified after turning the power to the instrument off.

(1) The Principal User.

(2) Health Physics Officer, WRAMC (Ext. 5107).

(3) Charge of Quarters of appropriate building.

b. In the event of FIRE in the room the following will be done immediately:

(1) Notify the WRAMC Fire Department (Main Section-3317, F.G.S.-5317).

(2) Notify the Principal User.

(3) Notify the Health Physics Officer, WRAMC (Ext. 5107).

(4) Notify Charge of Quarters of appropriate building.

(5) The senior individual at the site should clear the area of personnel and attempt to turn off the power to the instrument.

c. Power Failure. In the event of a power failure no danger exists.

5. Gas Chromatograph Detectors. Some of the detectors presently used at WRAMC employ the use of a radioactive source as a supply of electrons to effect the detection of gasses according to their molecular weights and holdup times.

a. Tritium Foil. Tritium is usually bound to a copper or stainless steel foil as titanium tritide. The binding agent may begin to break down and allow liberation of tritium at temperatures as low as 150°C (See Addendum 1). The Gas Chromatograph units should have a built in thermocouple to shut the unit off at 220°C since the tritium would probably be entirely evolved at this temperature.

(1) Vented Detectors. Some of the detectors are equipped with exit ports for venting potentially contaminated gases. These detectors while in use shall be vented to a sink under running water or into an operating Health Physics approved fume hood.

MEDEC-HPO
MEMO
Number 14

(2) Non-vented Detectors. These detectors have no provision for control of potentially contaminated exhaust gases and should be used in an operating, Health Physics approved, fume hood. The gases in these detectors are forced through a rubber leak seal at the end of the cylinder. These detector cylinder caps become highly contaminated on the inside surface and shall not be displaced from their cylinders without Health Physics inspection and approval.

b. ^{226}Ra, ^{210}Pb, ^{90}Sr, and ^{63}Ni containing detectors. Temperatures below 500°C are not sufficient to break down the binding of these metallic isotopes to the detector foils. Therefore moderately high temperatures are not a consideration in their operation. These sources may, however, be partially exposed when dismantling the detector unit; accordingly detector units shall not be dismantled without Health Physics approval.

Claude M. Wiblin

CLAUDE M. WIBLIN
1LT, MSC
Asst. Health Physics Officer

SUPPLEMENT F

Health Physics Memo No. 3
Release of Radioactive Material to the Sanitary Sewage System

nn/7/f

HEALTH PHYSICS
WALTER REED ARMY MEDICAL CENTER
Washington, D.C. 20012

MEDEC-YHP
MEMO 3

31 May 1974

RELEASE OF RADIOACTIVITY TO THE SANITARY SEWAGE SYSTEM

1. In accordance with ANNEX N, WRAMC Reg 40-10, disposal of radioactive material by release into the sanitary sewage system is permitted under certain conditions which allow the user to release a quantity not to exceed ten (10) times the amount listed in the Appendix to ANNEX N, in any one day.

2. However, Title 10 CFR Part 20.303 requires:

a. The quantity which if diluted by the average daily quantity of sewage released into the sewer by the licensee, will not result in an average concentration greater than the limits specified in Appendix B, Table 1, Column 2 of 10 CFR Part 20.

b. The quantity which if diluted by the average monthly quantity of sewage released into the sewer by the licensee, will not result in an average concentration greater than the limits specified in Appendix B, Table 1, Column 2 of 10 CFR Part 20.

c. "The gross quantity of licensed and other radioactive material released into the sewerage system by the licensee does not exceed one curie per year."

d. The sum of the ratios for each radionuclide in the mixture and the limit otherwise established in Appendix B for the specific nuclide not in a mixture may not exceed "1" (i.e., "unity").

3. Determination of method for compliance:

a. A maximum daily limit of activity was established for each isotope that is allowed to be released into the WRAMC sanitary sewage system according to the following formula:

$$\frac{(MPC_a)\ (\text{Flow Rate})}{(\#\ \text{of sinks})\ (\#\ \text{of isotopes to be released})}$$

NOTE: Flow rate through WRAMC Main Post has been established as 2.61×10^9 ml/day

b. The values calculated by the method in subparagraph A above was compared to ten (10) times the corresponding values listed for each isotope in Appendix C, 10 CFR 20; the lower of the two values was selected.

c. Contaminated laundry is washed under the supervision of Health Physics personnel. The total activity released is extracted by calculation and dose rates.

d. Radioactive waste in hold-up tanks is released at a rate such that the daily average concentration in the sewage system is less than 4×10^{-7} uCi/ml.

e. All releases are documented by date, time, location, isotope and total activity. This data is reviewed monthly for compliance and the total gross activity released for the month is recorded.

Bobby R Adcock

BOBBY R. ADCOCK
LTC, MSC
Health Physics Officer

2 Incl
1. Sample Calculations
2. Appendix to ANNEX N, WR 40-10

MEDEC-YHP
MEMO 3

SAMPLE CALCULATIONS

1. Maximum daily limit for each sink (Cl-36)

$$\frac{(MPC_a)\ (\text{Flow Rate})}{(\#\ \text{of sinks})\ (\#\ \text{of isotopes to be released})} =$$

$$\frac{(2 \times 10^{-3}\ \mu Ci/ml)\ (2.61 \times 10^{9}\ ml/day)}{(50)\ (100)} \simeq 1{,}000\ \mu Ci/day$$

This value was then compared to 10 times the limit listed in Appendix C, 10 CFR 20 (100 μCi/day for Cl-36), and the lower of the two was selected. This procedure increases the probability of compliance.

2. Contaminated Laundry. On the assumption that 100% or the radioactivity on contaminated laundry is washed off in the normal wash cycle of the standard commercial washing machine, the following calculations are submitted:

a. General.

(1) Maximum contamination level put into laundry: 2 mR/hr @ 1 ft.

(a) Iγ for ^{131}I = 0.25 mR/hr/μCi at 1 yard or
2.25 mR/hr/μCi at 1 foot

(b) Iγ for ^{198}Au = 0.27 mR/hr/μCi at 1 yard or
2.43 mR/hr/μCi at 1 foot (approximately the same as ^{131}I)

(2) $\frac{2.0\ mR/hr}{2.25\ mR/hr/\mu Ci} =$ 0.88 μCi max ^{131}I (or ^{198}Au) in system

b. Dilution Factor. The washer that is primarily the one used for washing of contaminated laundry uses between 450 and 500 gallons of water per wash load. For the purpose of this calculation 450 gallons was assumed to be the minimum volume.

(a) (450 gal) $(3.785 \times 10^{3}$ cc/gal) = 1.705×10^{6} cc

(b) Therefore: 0.88 μCi/1.705×10^{6} cc = 5.17×10^{-7} μCi/cc

c. Effluent activity from the wash water = 5.17×10^{-7} μCi/cc

WR 40-10, C-1

APPENDIX (RADIOACTIVE WASTE DISPOSAL SINK DUMP LIMITS)
to ANNEX N (RADIOACTIVE WASTE)

THE RADIOACTIVE MATERIAL DISCHARGED THROUGH THIS SINK MUST BE READILY SOLUBLE OR DISPERSIBLE IN WATER. THE QUANTITIES OF THE COMMONLY-USED RADIONUCLIDES DISCHARGED THROUGH THIS SINK IN ANY ONE DAY MUST NOT EXCEED TEN (10) TIMES THE AMOUNT SPECIFIED BELOW (For isotopes not listed, call Ext. 3481 for limits).

Material	Microcuries
Antimony-124	10.00
Arsenic-74	10.00
Barium-140	10.00
Bismuth-210	1.00
Bromine-82	10.00
Cadmium-109	10.00
Cadmium-115	40.00
Calcium-45	10.00
Calcium-47	10.00
Carbon-14	100.00
Cerium-141	100.00
Cerium-144	1.00
Cesium-131	1000.00
Cesium-137	10.00
Chlorine-36	10.00
Chromium-51	1000.00
Cobalt-58	10.00
Cobalt-60	1.00
Copper-64	80.00
Fluorine-18	1000.00
Gold-198	100.00
Hydrogen-3	1000.00
Indium-113m	100.00
Iodine-125	1.00
Iodine-129	0.10
Iodine-131	1.00
Iridium-192	10.00
Iron-55	100.00
Iron-59	10.00
Manganese-54	10.00
Manganese-56	10.00
Mercury-197	100.00
Mercury-203	10.00
Molybdenum-99	100.00
Nickel-63	10.00
Phosphorous-32	10.00
Potassium-42	10.00
Rubidium-86	10.00
Selenium-75	10.00
Sodium-24	10.00
Strontium-85	10.00
Strontium-89	1.00
Strontium-90	0.10
Sulphur-35	80.00
Tantalum-182	10.00
Technetium-99m	100.00
Technetium-99	10.00
Thallium-204	10.00
Thorium (natural)	10.00
Tin-113	10.00
Uranium (natural)	20.00
Zinc-65	10.00
Zinc-69m	100.00
Zirconium-95	10.00

SUPPLEMENT G

DESCRIPTION AND USE OF SPECIFIC SEALED SOURCES

1. Cesium-137, American Nuclear Corp Type 127 Source
2. Americium-241, Monsanto Model No. MRC-2704 Source
3. Health Physics SOP No. 2-5, Calibration Range

nn/7/g

GAMMA CALIBRATION UNIT

MODEL 8150-XXXAB

INSTRUCTION MANUAL

PREPARED BY

PAUL R. ELLIS, JR.
ALBUQUERQUE DIVISION
OF
EBERLINE INSTRUMENT CORPORATION
ALBUQUERQUE NEW MEXICO

INTRODUCTION

This is the operating and instruction manual for Eberline Instrument's Model 8150-XXXAB Gamma Calibration Range. The last five digits of the model number describe the size and type of source material used; i.e., 60 curies of C_o^{60} would be model 8150-60 C_o, 120 curies of Cs 137 would be model 8150-120 Cs.

The model 8150-XXXAB was designed to provide a manually operated, relatively portable range, yet one which is readily usable for all normally encountered Gamma radiation calibration requirements.

GENERAL

The Gamma Calibration Unit, Eberline Instrument Corporation Model 8150-XXXAB consists of a source shield on a caster mounted platform, a separate back shield on a caster mounted platform, and an instrument cart mounted on a track. The track is readily removable for ease of movement of the entire Calibration Unit.

Lead shot is used for shielding to facilitate mobility of the unit.

The source used with this unit is an ANC Type 127 sealed unit or equivalent. The sources used have either a soft iron flanged rod brazed to the cap or will be placed in a holder with a soft iron flange to provide a mechanical and magnetic means of grasping and holding the source with handling tools.

Optical viewing equipment is provided for observation of meter dials on the instruments being calibrated.

SHIELD CART ASSEMBLY

The cart assembly will be welded steel construction with cover plates on all sides and with casters for ease of movement. A door is provided on the cart assembly to be used for storage of collimators and other miscellania. The cart assembly holds the source shield assembly, radiation alarm, lights and switches.

SOURCE SHIELD ASSEMBLY

1. The source shield assembly is of welded 1/4" steel, constructed 18 inches in diameter and 25.5 inches in height and has the following:

   A. A cylinder with two inch ID, straight through the center (top to bottom).
   B. On the bottom, a plate with blind tapped holes to provide a means of securing the unit to the cart assembly.
   C. Three access plugs are placed on top and bottom for filling or draining lead shot.
   D. The top has a hasp to accept a security type pad lock.
   E. A steel jacketed solid lead plug, to which is secured an interlock switch is inserted in the bottom of the 2-inch cylinder and bolted to the bottom plate.
   F. A solid lead filler plug fills the void between upper and lower plug.
   G. The upper portion of the 2-inch cylinder has two solid lead plugs which form a part of the lifting mechanism. The stainless steel source holding cup is attached to the bottom of the outer plug. The inner plug is removed to insert the source and when replaced completes the shield.
   H. When the source is in a safe condition (completely housed), an interlock switch, located in the center of the shield assembly operated by the source holder, causes a white light to be lighted.

I. When the source is moved away from its rest position, the interlock switch is allowed to operate causing the white light to be extinguished and the Red alarm light to be lighted.

J. When the source is moved to a location where radiation is emanating from the aperture, a second interlock switch is operated causing the howler to sound.

K. The howler is an electronic device, not obtrusively loud, which gives the operator additional warning that the source is up. The howler is located below the safe and alarm light support plate.

L. All switches are sealed and all wiring is routed through small conduit to the bottom of the cart assembly.

M. The orifice (Beam exit) is lead with a steel jacket and is made so collimator adapters of different types can be readily interchanged. The radiation beam is collimated to less than a 15 degree inclusive angle.

2. The source lifting mechanism is a hand operated lever which lifts the source into a fixed repeatable position in the beam orifice. Before the lever can be raised, the quick release pins must be removed. After the source has been raised, the release pins must again be replaced to keep the source in the orifice.

As the handle is raised, the cam follower on each side of the lifting mechanism follows a moving cam. This causes

the lifting rod to slide up a travel slot. The lifting rod depresses an interlock switch which actuates an audible signal. When Calibration is completed and the source is placed at rest, the rod releases the interlock switch deactivating the audible signal.

COLLIMATING ADAPTERS

1. These adapters are steel jacketed lead plugs.
2. The normal beam is zero attenuation with a collimated beam of less than 15^{o}. The adapters supplied provide:
   A. 10/1 attenuation
   B. 100/1 attenuation
   C. 1000/1 attenuation
   D. 10000/1 attenuation
   All attenuators provide a collimated beam of less than 15^{o}.
3. The adapters are all readily interchangeable requiring only the tightening or loosening of two thumbscrews to install or remove.

SHIELDING CALCULATIONS

1. 40 cu C_s^{137} at 1 foot yields 160 R/hr.
2. If source is centered in a 2" dia cylinder and a 5-inch shield is anticipated, then surface of shield is 6 inches from source.
3. Dose at 6 inces is 4x160 - 640 R/hr.
4. To attenuate dose to 5 mr/hr:
   Attenuation must be 640 R/ 5×10^{-3}R = 1.3×10^{5}
   Transmission must be less than .000008

Lead Thickness	Transmission	Mr/Hr on Surface
11 cm	.000008	5
13 cm	.000001	.6
15 cm	.1 of 13 cm	.06

5. From above table, 11 cm would provide adequate shield for the 40 curie source.
6. Following table shows equivalent thickness of lead and lead shot required:

Solid Lead	Lead Shot
11 cm 4.3 inch	13.8 cm 5.5 inch
13 cm 5.1 inch	16.3 cm 6.4 inch
15 cm 5.9 inch	18.8 cm 7.4 inch

7. Above calculations shown are for typical source. These would be modified as required for other source sizes and types of source material.

SHIELDING

1. For a source of 120 curies, 13 cm (5.1 inches) of lead shot would be adequate. However, to reduce the deterimental effects in other measurements, an 18 inch OD shield is being used.
2. The weight of the shield assembly is about 2500 pounds.

INSERTING THE SOURCE

1. To insert the source two bolts must be removed and the hoist mechanism tilted over. This requires the plug assembly to be rotated until hanger bolt unscrews from the inner plug cap. The inner plug cap is unscrewed and pulled out. The inner plug is now removed. The manipulator operator then removes the source from its container and lowers it into its resting place. CAUTION: DO NOT INSERT OR REMOVE INNER PLUG WITHOUT MANIPULATORS. The operator then picks up the inner plug and replaces it in position. The plug cap is then screwed in place sealing the opening and the hoist mechanism is put back in normal operating position.

REMOVING THE SOURCE

1. Remove the two bolts over the lifting mechanism. Again unscrewing the hoist mechanism from the inner plug cap.
2. Unscrew the inner plug cap and remove.
   CAUTION: DO NOT REMOVE INNER PLUG WITHOUT MANIPULATORS.
3. The manipulator operator removes the inner plug.
4. He then, using a magnet, inserts the removal tool and lifts out the source. He then places the source in its container and covers it.
5. The operator then replaces the inner plug and screws the cap into position, and reconnects the hoist mechanism.

INSTRUMENT CART

1. The Instrument Cart sits on a track seven feet long.
2. The track is steel and is bolted to the shield unit and the back stop unit. It is strong enough to hold the two units rigidly together. The track is readily removable from both units for storage and for movement of the calibration assembly.
3. A metric scale is securely fastened to the side of the track with dimensions to indicate distance from source center line.
4. The cart has an elevating platform (5 inches vertical adjustment) for alignment with the beam center line.
5. A sloped plate is located on the side of the cart so that instruments with separable detectors can be held out of the beam to facilitate calibration.
6. A pointer is located on the cart to readily show distance from the source.
7. An idler wheel is located on the opposite side of the cart from the instrument plate to prevent tipping the cart.

ADDITIONAL SAFETY FEATURE

1. In case of power failure, there are two methods of indication as to position of the source. Should the source be in the raised position, the lift handle is a mechanical indicator and a visual indication is the bright red and white stripped decal on the plug.

OPTICAL VIEWING EQUIPMENT

1. To facilitate reading the meter face of the instrument being calibrated, a mirror and binocular arrangement is used. On the Instrument Cart, a double hinged mirror is provided to "look at" the meter face. A two power binocular is mounted on a small frame at the side of the shield. The scope is provided with a pan and tilt mechanism. The binocular is mounted to the source shield.

PROTECTIVE MARKINGS

Eberline Instrument Corporation will label the unit as prescribed in paragraph 20.203 of Part 20 STANDARDS FOR PROTECTION AGAINST RADIATION, dated August 9, 1966.

The Gamma Calibration Unit will be marked on two sides with the conventional three-bladed symbol. It's background will be yellow. The three-bladed symbol will be magenta. The symbol will also be placed on the front and rear of the back plate assembly.

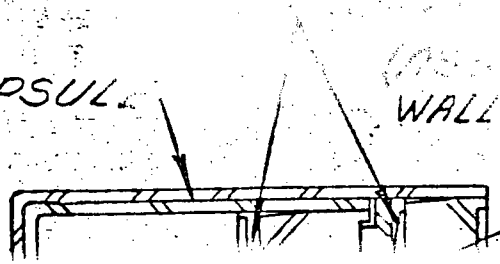
On the calibration unit, in front of the operator's position, will be an engraved instruction tag stating the proper method of operation, type of source, activity of source, and, again, a radiation warning notation.

OPERATING PROCEDURES

WARNING DANGEROUS RADIATION

1. Place instrument to be calibrated in instrument cart in desired position.
2. Raise cart with end crank until probe of instrument is in center of beam.
3. Move cart to position on rails to produce the desired radiation level.
4. Alternately adjust mirror on instrument cart and binoculars on source shield until instrument dial can be read clearly through the binoculars.
5. Remove lock from 10,000 to 1 attenuator in beam aperture loosen thumb screws, and insert desired attenuator. Tighten thumb screws. NOTE: If zero attenuation desired, the 0 attenuator must be inserted for correct beam collimation.
6. Remove lock from top of source shield and remove the hold down fixture.
7. Unit is now ready for operation.
8. When beam is desired, pull quick release pin and raise handle until vertical and quick release pin engages hole.
9. Full radiation beam will now be emitted from unit.
10. Read instrument dial through binoculars and mirror.
11. To lower source pull quick release pin and lower handle. Audible alarm will go off. Red light will go off and white light will come on.
12. When source range is not in use, insert and lock hold down fixture on source shield.
    Place 10,000 to 1 attenuator in beam aperture and lock.

AISI TYPE 316LC AISI TYPE 316LC



INNER CAPSULE

SPRING SPACER

SPRING DISK

OUTER CAPSULE

INNER CAP

WELD T.I.G.

SOURCE Cs 137 PELLETS (120 CURIES)

CAPSULE ASS'Y.

CESIUM 137 SOURCE CAPSULE 120 CURIES		
AMERICAN NUCLEAR CORP. P.O. BOX 426 OAK RIDGE, TENN		
DRAWN B.D.CHAMBERS	CHECKED	APPROVED
DATE 1-3-67	SCALE NONE	DWG.NO C-M 7018

TEST RESULTS
FOR
120 CURIE CESIUM-137
SOURCE CAPSULE

AMERICAN NUCLEAR CORPORATION
Post Office Box 426
Oak Ridge, Tennessee

1. DEFINITION:
The source capsule was manufactured to dimensions, tolerances, and of material shown on American Nuclear Corporation drawing CM-7018. The substitute used for the radioactive Cesium-137 was cesium chloride powder pressed into a pellet.

The tests run were those corresponding to Class III C in the Oak Ridge National Laboratory Source Capsule Classification Test Procedures (copy attached).

Vacuum leak testing as described in part 2 was used as the ultimate test of capsule integrity.

2. VACUUM LEAK TEST PROCEDURE:
There were no differences in the leak test used and the leak test procedures described in ORNL Test Procedures. Leak test fluid used was reagent grade Isoprople Alcohol.

3. MAXIMUM TEMPERATURE RESISTANCE TEST:
The capsule was placed in a stainless steel gas fired oven along with a thermocouple and held at 1700° for one hour. The capsule was then removed and cooled to room temperature. Capsule was blackened and showed signs of bulging near the window end. No cracks were apparent. Capsule was leak tested according to part 2 procedures and no bubbles were seen.

DATE: 2-28-67 Performed by: R. P. Rosenbaum

Witnessed by: C. L. Moulton

4. OPERATING TEMPERATURE TEST:
Part 1 - The capsule was placed in an insulated container of liquid nitrogen and left 24 hours. Then the capsule was removed and allowed to return to room temperature. There was no apparent physical change in the capsule, and a leak test showed no bubbles.

DATE: 3-5-67 Performed by: J. Slemenda, Jr.

Witnessed by: C. L. Moulton

4. Part 2 - Capsule cleaned with acetone and dried before weighing. Capsule weight = 26.83260 g. Capsule placed in preheated air atmosphere 500° F oven and left 24 hours; then removed, cooled to room temperature, cleaned with acetone, and weighed again. Capsule weight was 26.83190 g. This is approximately 0.05% by weight of the least outer wall which is less than the allowed 1%.

Source showed no apparent defects and passed the leak test.

DATE: 3/6/67 Performed by: J. Slemenda

Witnessed by: C. L. Moulton

5. THERMAL SHOCK TEST:
The capsule was placed in a 500° F oven for one hour then plunged into a salt water ice bath and left ten minutes. The capsule was then plunged into liquid nitrogen and left one hour. The capsule was removed and brought back to room temperature. There was no apparent change in capsule and a leak test showed no bubbles.

DATE: 3/6/67 Performed by: J. Slemenda

Witnessed by: C. L. Moulton

6. TEMPERATURE - HUMIDITY CYCLING RESISTANCE TEST:
No test required for Class III C capsules.

7. EXTERNAL PRESSURE RESISTANCE TEST:
The capsule was cleaned with acetone and dried and weighed. Capsule weight + 26.83235 grams. The capsule was then placed in a water filled chamber of 1 inch square area. A piston with 'O' rings to prevent leakage was then inserted into the chamber and 1100 pounds weight placed on the piston. The capsule was removed after the specified 15 minutes, cleaned in acetone, dried and weighed. Capsule weight + 26.83260 grams. Net capsule gain was 0.00025 grams which is less than the .0005 grams allowed. Capsule was unchanged upon visual inspection and passed the leak test.

DATE: 3/6/67 Performed by: J. Slemenda

Witnessed by: C. L. Moulton

8. PUNCTURE RESISTANCE TEST:
The capsule window end was centered on a 1/4" high, 1/8" diameter stainless steel pin which was mounted to a mild steel base plate. A steel rod weighing 240 grams was dropped from a height of two feet through a guide pipe and impacted onto the weld end of the capsule. Inspection revealed a dent in the window end approximately 1/16" deep. Leak testing showed no bubbles.

DATE: 3/2/67 Performed by: B. D. Chambers

Witnessed by: C. L. Moulton

9. RESISTANCE TO CRUSHING TEST:
The capsule was placed upon a steel plate with the right cylindrical center line parallel to the plate. Another steel plate was then placed on the capsule and parallel to the first plate. A weight of 2100 pounds was then placed on the top plate in such a fashion as to keep the top plate balanced on the capsule, and left for one hour. Inspection of the capsule after removal showed that the window end had been flattened approximately 1/32". Leak test showed no bubbles.

DATE: 3/2/67 Performed by: B. D. Chambers

Witnessed by: C. L. Moulton

10. RESISTANCE TO SHEAR TEST:
The capsule was placed in a frame so that one end of the capsule was fixed. A 90° shearing edge with a slightly larger diameter than the capsule diameter was then applied near the center of the capsule and a weight of 1100 pounds applied for one hour. The capsule showed an indentation of about .007 inches but did not leak when tested.

DATE: 3/2/67 Performed by: B. D. Chambers

Witnessed by: C. L. Moulton

11. IMPACT FORCE RESISTANCE TEST:
The capsule was placed weld end down on a steel plate. A 1 inch diameter steel rod weighing 12 pounds was dropped from a distance of five feet through a guide tube and impacted on the window end of

the capsule. The capsule suffered no apparent physical damage and did not leak when tested.

DATE: 3/2/67 Performed by: C. L. Moulton

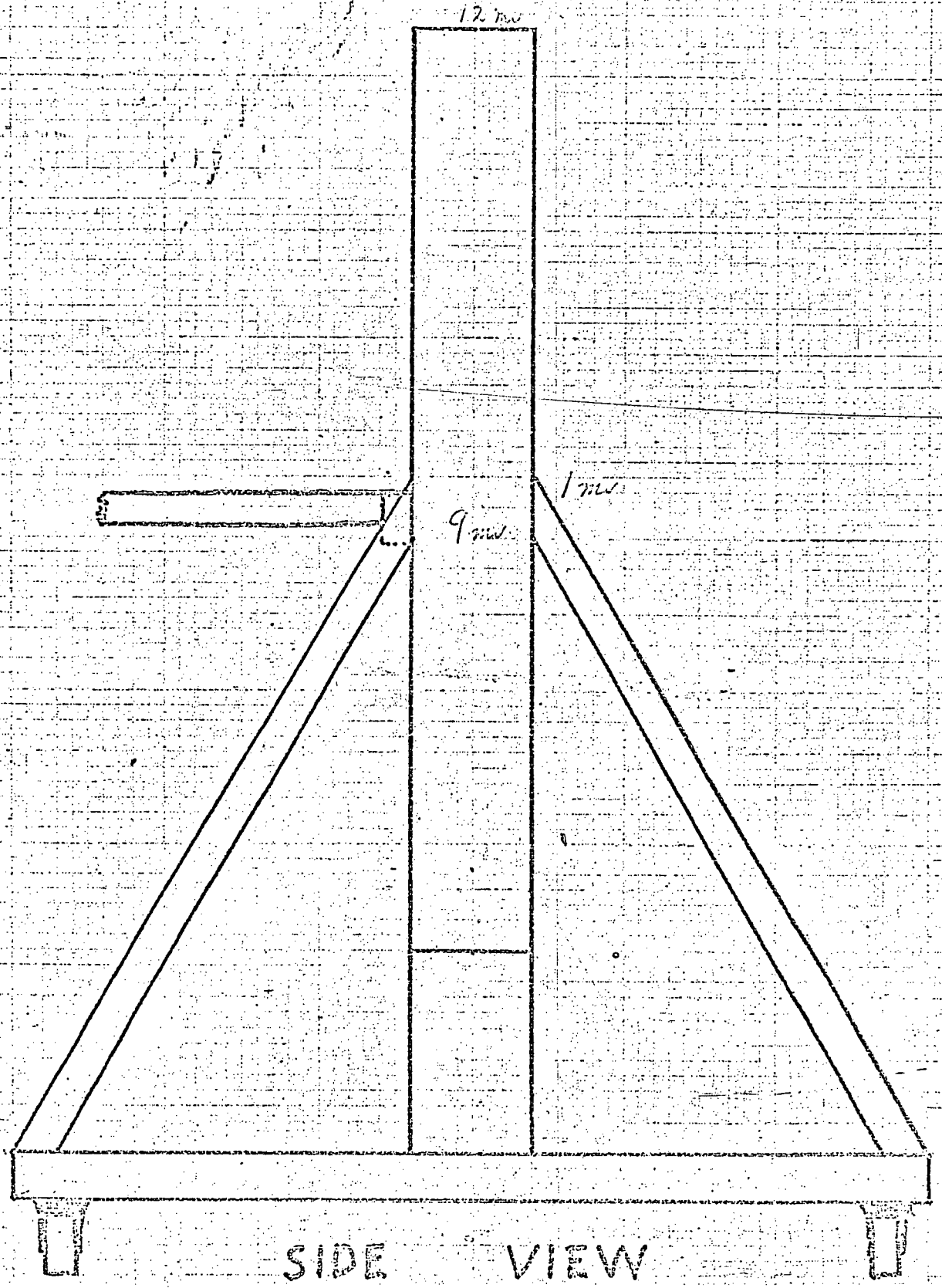
Witnessed by: J. Slemenda

12. VIBRATION RESISTANCE TEST:
Not required for Class III C capsule.

SOURCE CALIBRATION UNIT
RADIATION PROFILE SOURCE

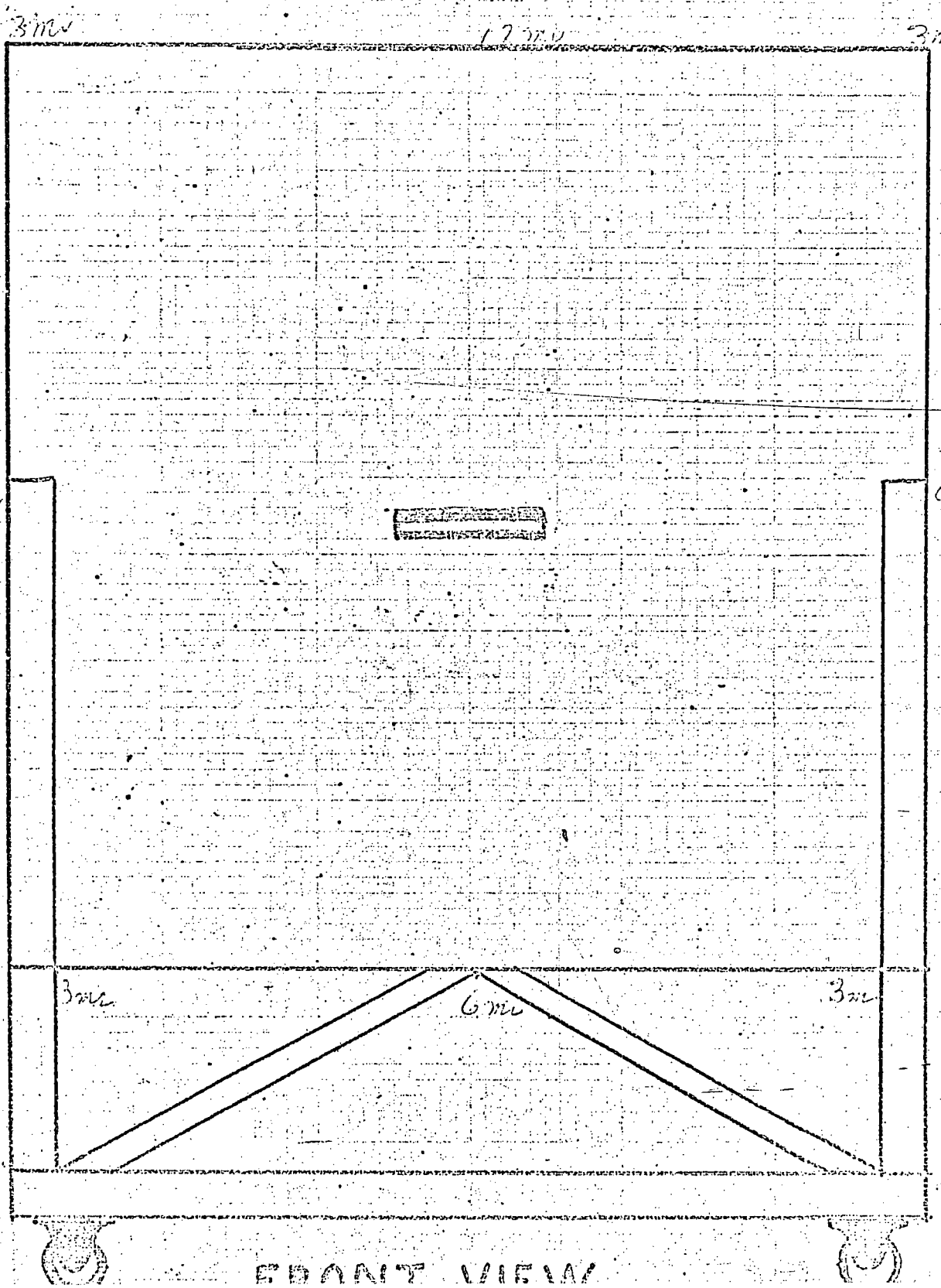
CESIUM 137
120 CURIES

SOURCE UP INSTRUMENT Radeco SER.NR. 2175
Ranger Mod. E-400 571

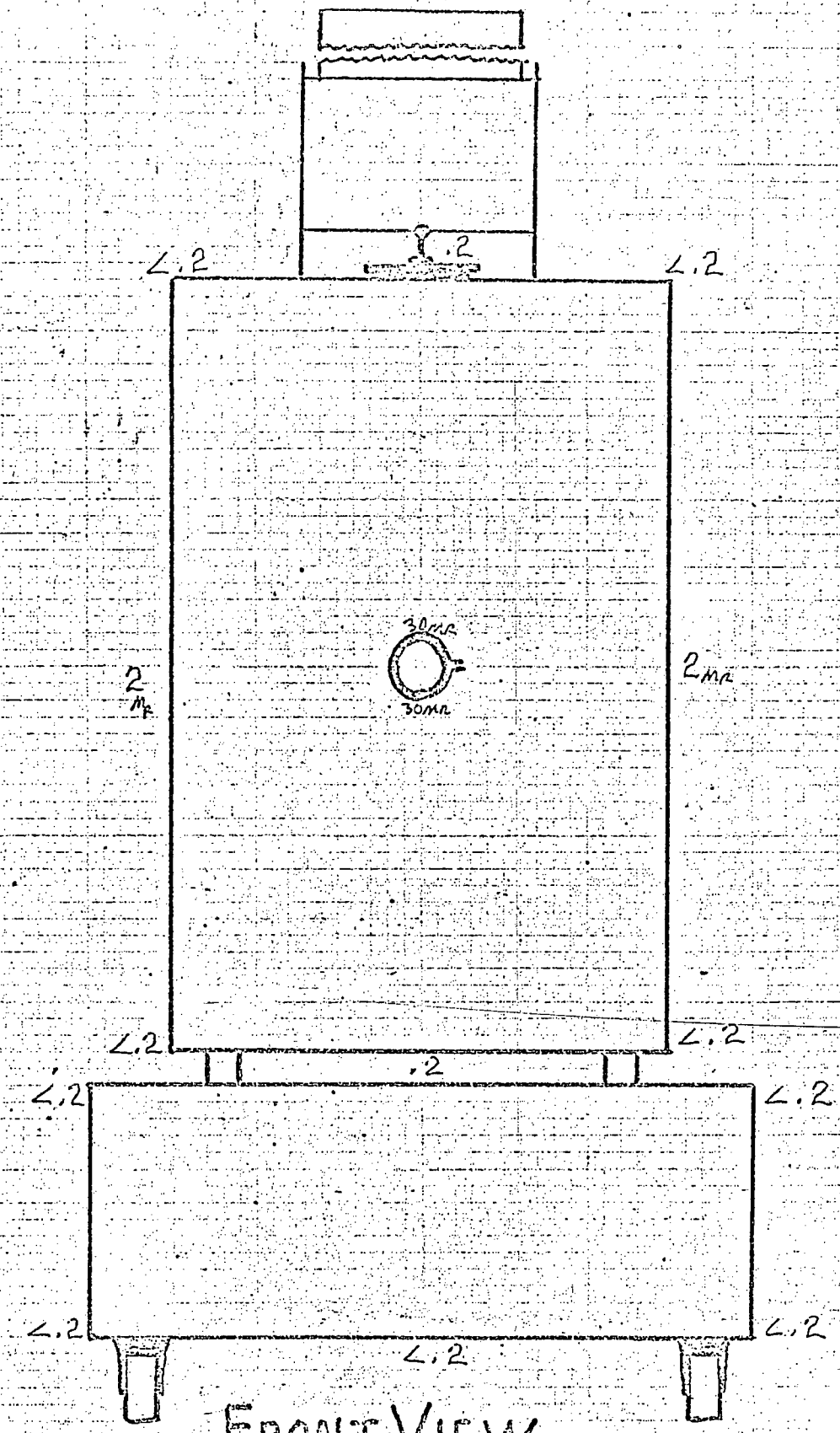


SIDE VIEW

OURCE UP INSTRUMENT Radiator SER.NR. 2175
Siegen Mod. E 400 511



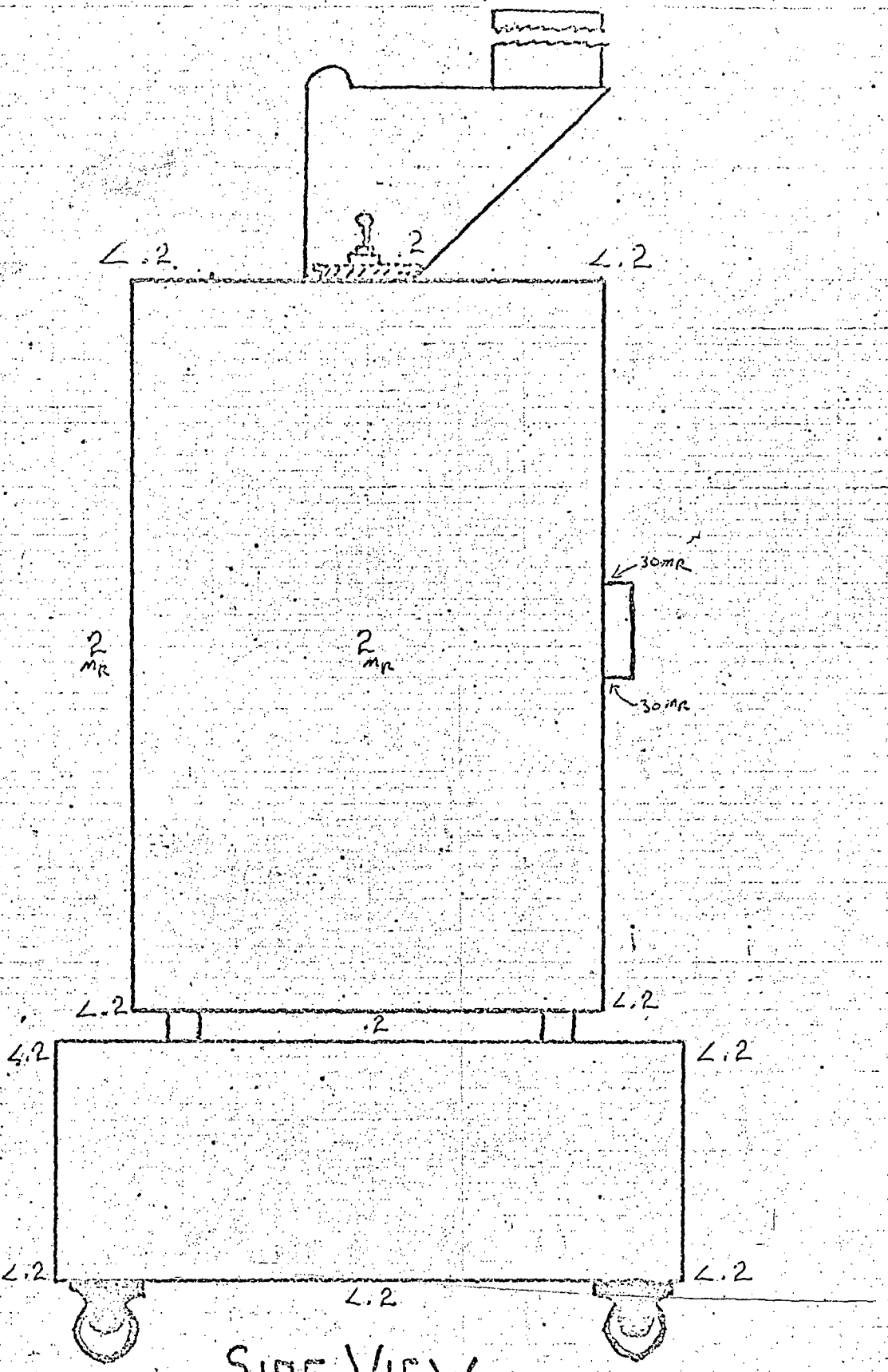
FRONT VIEW



FRONT VIEW

X-0 ATTENUATOR

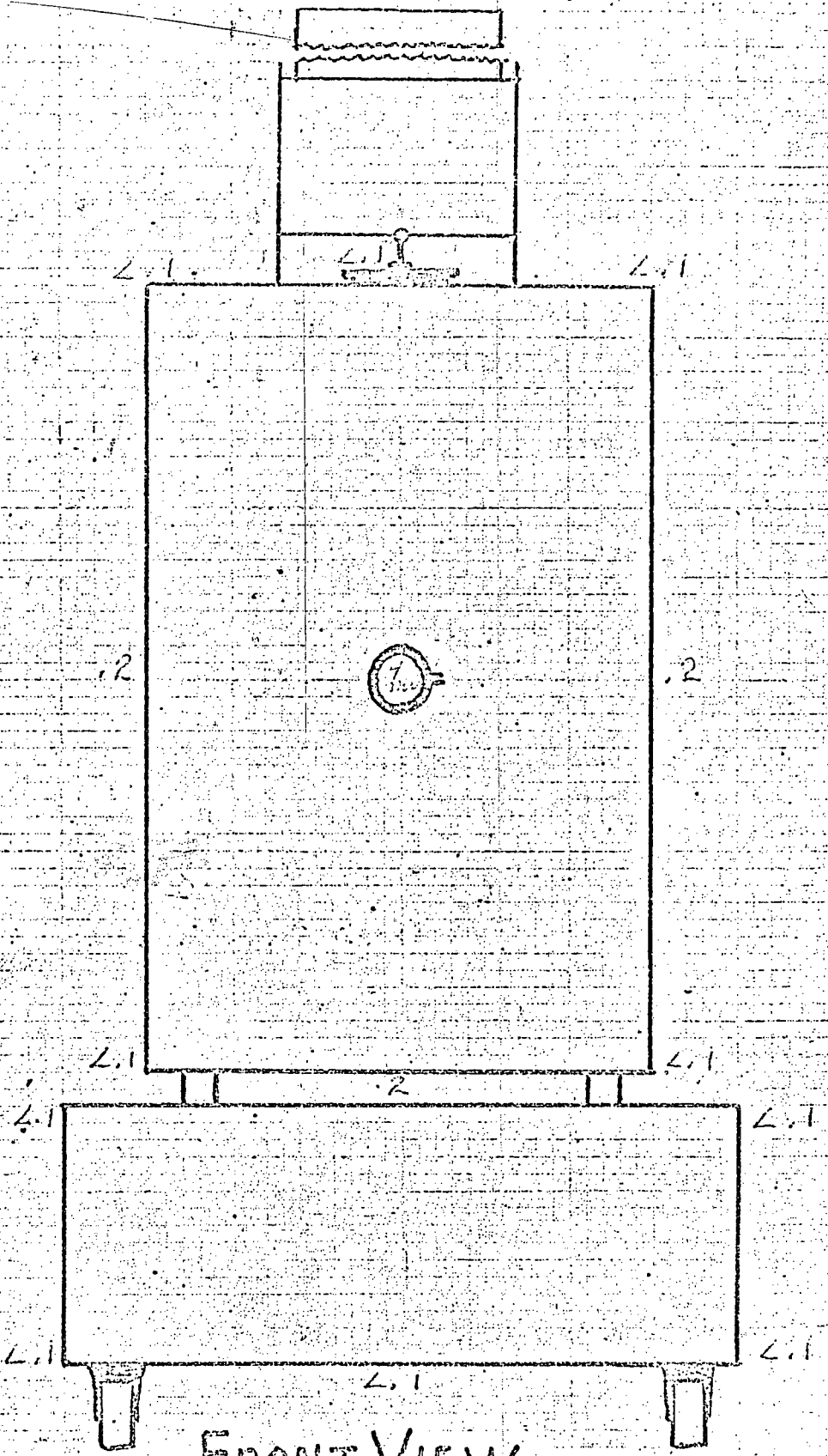
SOURCE UP INSTRUMENT RADECTOR SED NO 2175



SIDE VIEW

X-0 ATTENUATOR

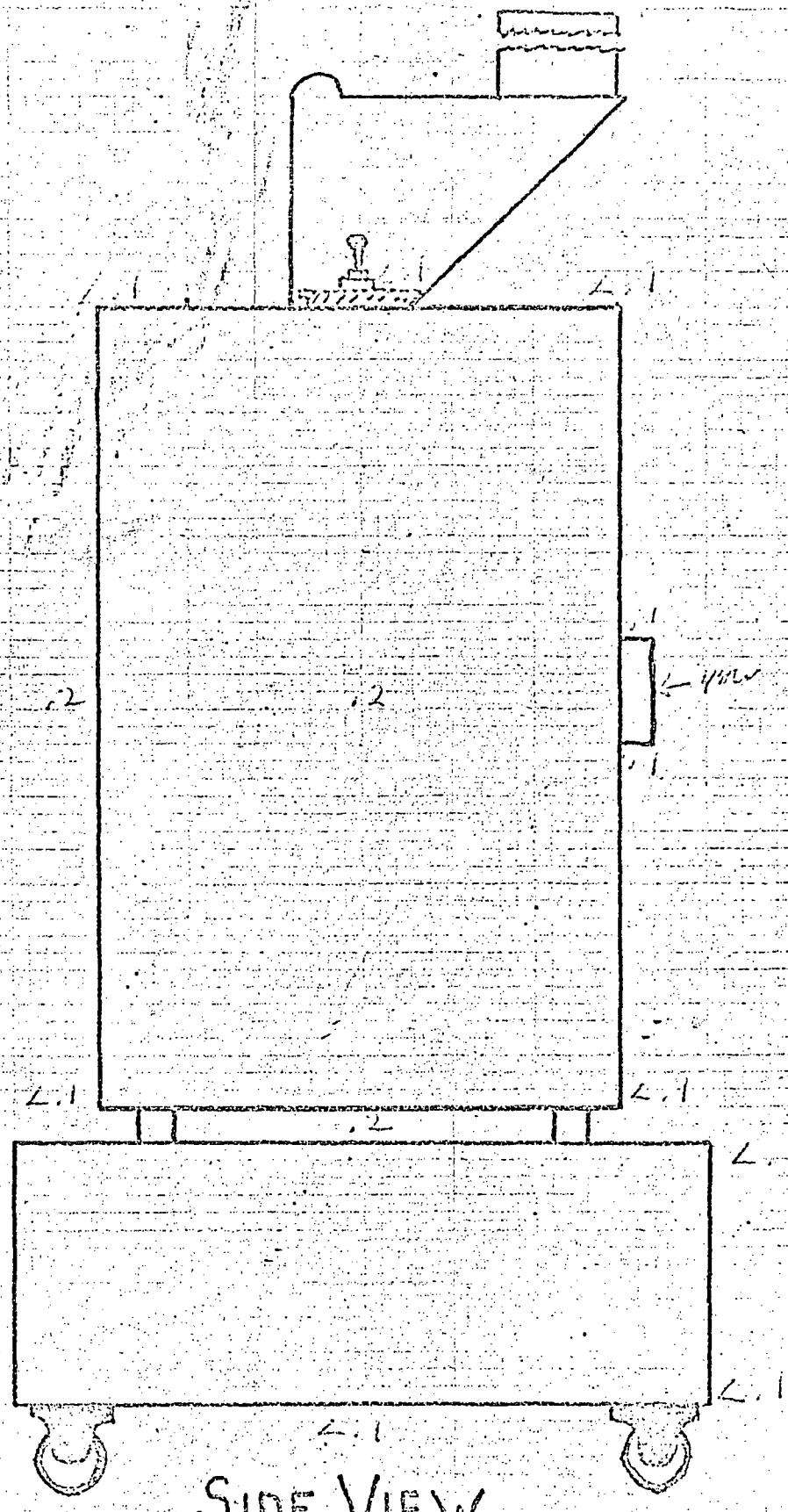
CAUDCE 1/D INTERMEDIATE RADIATOR CRD NO. 2175



FRONT VIEW

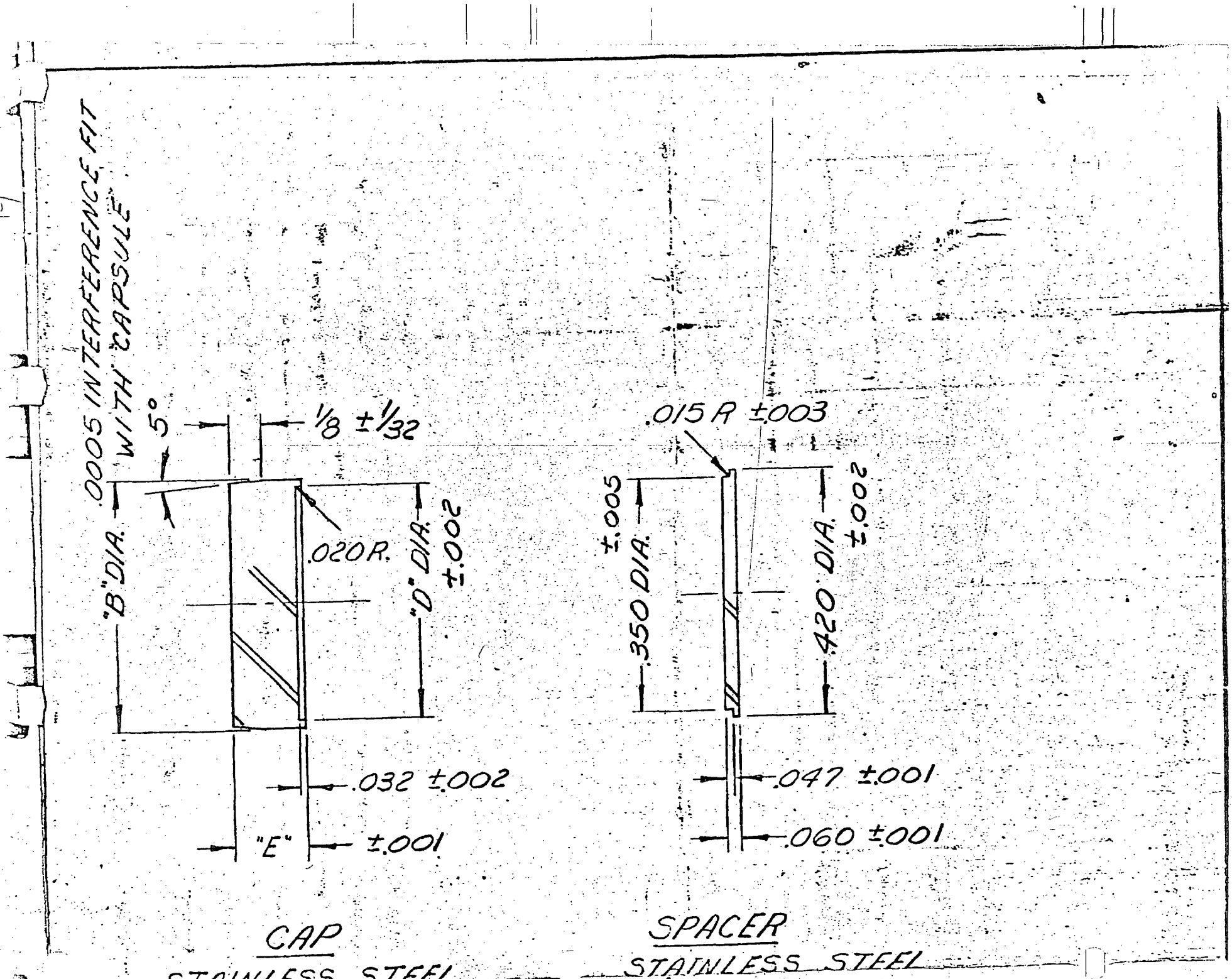
X.O attenuator

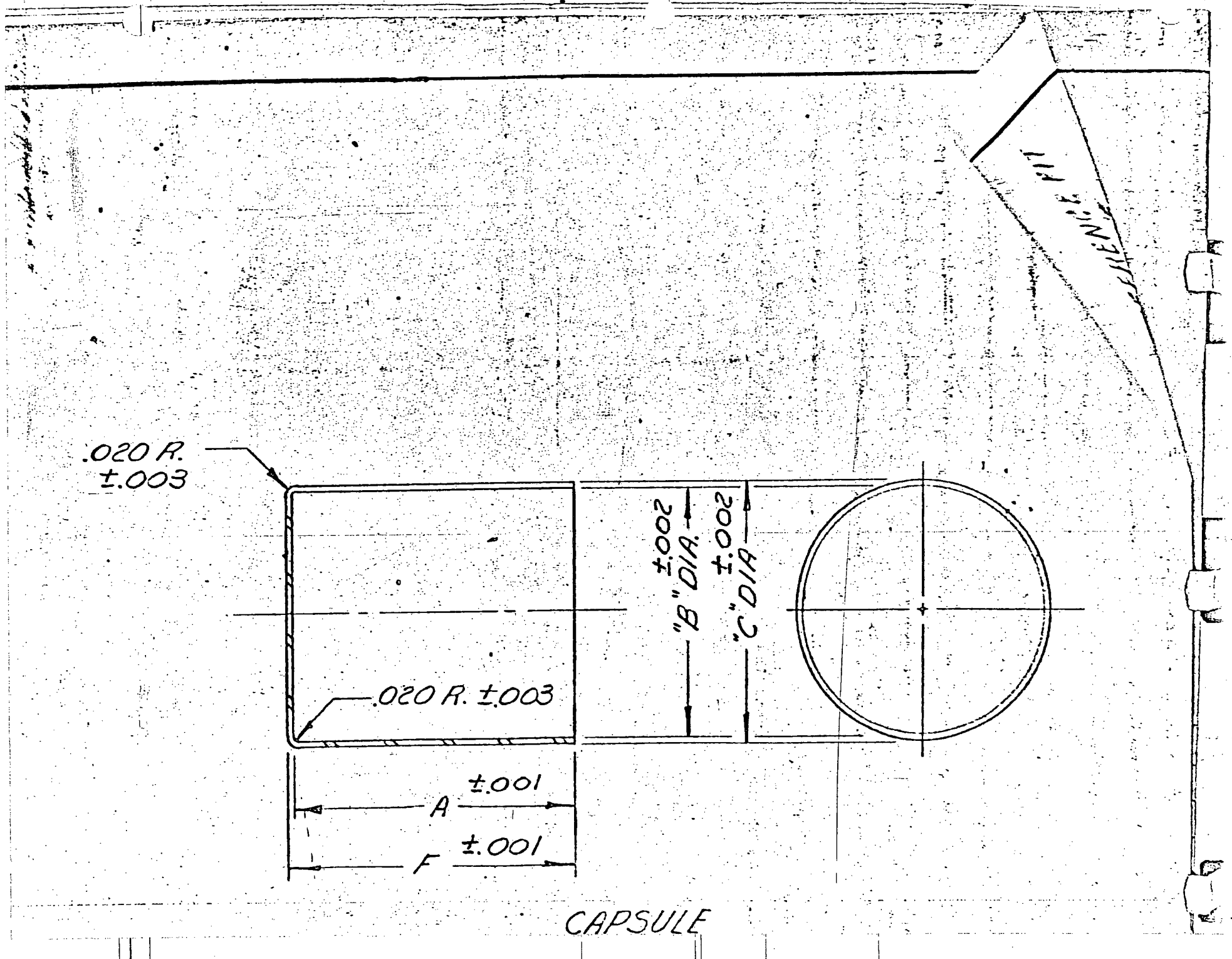
SAMORE DAVIN INSTRUMENT Rack CED NO 7105



SIDE VIEW

X-0 attenuator

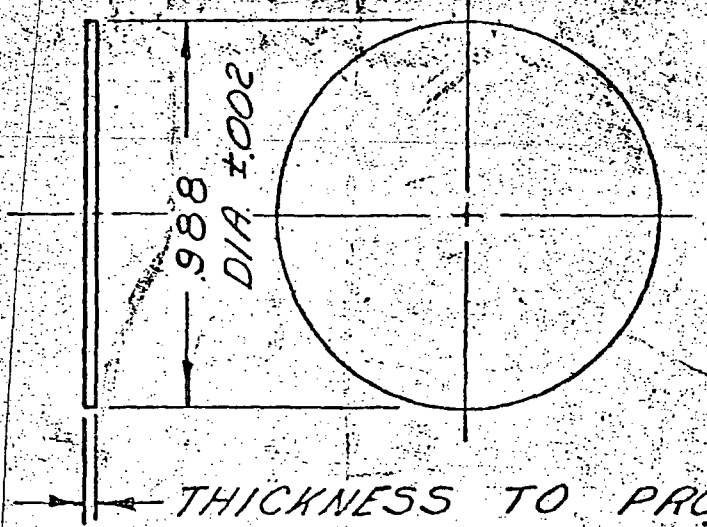

.0005 IN INTERFERENCE FIT WITH CAPSULE
5°
1/8 ±1/32
"B" DIA.
.020 R.
"D" DIA. ±.002
.032 ±.002
"E" ±.001
CAP
STAINLESS STEEL
.015 R ±.003
±.005
.350 DIA.
.420 DIA. ±.002
.047 ±.001
.060 ±.001
SPACER
STAINLESS STEEL



CAPSULE

AISI TYPE 316L

TABULATION	LENGTH A	B	DIA C	D	E
OUTER CAPSULE	1.555	.450	.490	.400	.325
INNER CAPSULE	1.160	.400	.440	.350	.341



SPRING SUPPORT DISK
STAINLESS STEEL AISI TYPE 316L

MEDEC-YHP

17 MAY 1973

SUBJECT: Amendment to USAEC License 08-01738-02

THRU: Commander
Health Services Command
ATTN: HSC-PA-H
Ft. Sam Houston, TX 78234

HQDA (DASG-HEP)
Washington, D.C. 20314

TO: Director
Division of Materials Licensing
U.S. Atomic Energy Commission
Washington, D.C. 20545

1. Request that USAEC Byproduct Material License 08-01738-02 be amended as described below:

Conditions 6, 7, 8, 9, and 10. ADD: Americium 241, Sealed Source, Monsanto model MRC-2704, doubly encapsulated in welded stainless steel. The plugs are heliarced using a Tungsten inert gas weld. A drawing of the source capsule is enclosed (Incl 1). The total source consists of twenty (20) such capsules, each containing approximately one (1) Curie of ^{241}Am. Total activity of source - Approximately 20 Curies.

2. The chemical form of the source material is AmO_2. The physical form of the material is a powder. The activity is deposited in the source capsule by the Monsanto Research Corporation. The material is deposited as a powder mixture of AmO_2 and powdered aluminum and compacted in place by hydraulic pressure.

3. The source will be a component of the ORTEC model 4820 Fluorescence Scanning System, marketed by ORTEC, Incorporated, of 100 Midland Road, Oak Ridge, Tennessee, 37830. A copy of the article which describes the

HEALTH PHYSICS COMEBACK COPY (1974)

system is enclosed (Incl 2). The source is mounted in a combination source holder/ detector collimator arrangement which is fabricated of lead, aluminum, and stainless steel. The shutter is a lead sheet which is mounted to the base of the collimator. Removal of the shutter activates a microswitch which turns on a warning light mounted on the body of the scanner. With the shutter in place, the radiation level at one meter from the source is not detectable above background.

4. The fluorescence scanning device will be housed in the Nuclear Medicine Service, Walter Reed Army Medical Center. Its purpose is clinical evaluation of the usefulness of fluorescence thyroid imaging in patients. The device operates by directing a collimated beam of 60 KeV photons from the Americium 241 source onto the thyroid gland. The Iodine in the thyroid gland will give off characteristic x-rays which are detected in a Silicon solid-state detector. This technique is unique in that no isotope is administered internally. The only organ which is subjected to an exposure is the thyroid. Internal scatter to other organs would be negligible.

5. Inclosure 3 contains three (3) drawings: The fluorescence source configuration, the source holder and collimator, and a picture of the complete system scanning a patient. The twenty (20) source capsules are arranged in a circular fashion around the detector. They fit in a source holding ring and are held in place by a retaining ring and collimator combination. The retaining ring and collimator are physically separate from the source holding ring. A series of bolts run through the collimator and source holding ring into a plate which is attached to the mechanical arm of a rectilinear scanner. Also mounted in the system is the Liquid Nitrogen dewar, which is used to keep the Si(Li) detector at optimum operating temperature.

6. Source model MRC-2704 is part of the 2700 series of sources available from Monsanto. The source models in this series differ only in the source diameter. Monsanto has tested the largest diameter source, O. D. Inner Assembly 0.990 inches, O. D. Outer Assembly 1.125 inches, and the smallest diameter source, O. D. Inner Assembly 0.335 inches, O. D. Outer Assembly 0.437 inches. Monsanto claims to have established an agreement with USAEC such that results from the tests of the extremes of a series of sources which have similar construction but graduated dimensions can be interpolated to intermediate-sized sources. The sources were tested according to the ANSI classification system. The results of the tests indicate that model 2704 has an ANSI rating of 53534. Results of the temperature, vibration, and impact tests are included as representative of the nature of the tests to which the prototype sources were subjected (Incl 4). The source exceeds the classification required by ANSI for

sources to be used in medical radiography and gamma gauges. Because the prototype testing shows a classification of 53534, the source meets the "Special Form" criteria as described in 10 CFR 173.398.

7. Monsanto claims that established procedures are followed in quality control of the series 2700 sources. The minimum testing methods which are used to establish a leak-free source are the Pressure Bubble Test, which is described in section B2.9 of the ANSI classification, and the Wipe (Smear) Test, which is described in Section B2.1 (Incl 5).

8. Standard radiation warning signs will be used in the area occupied by the fluorescence scanner, and the proper radiation warning label will be affixed to the source holder/collimator assembly.

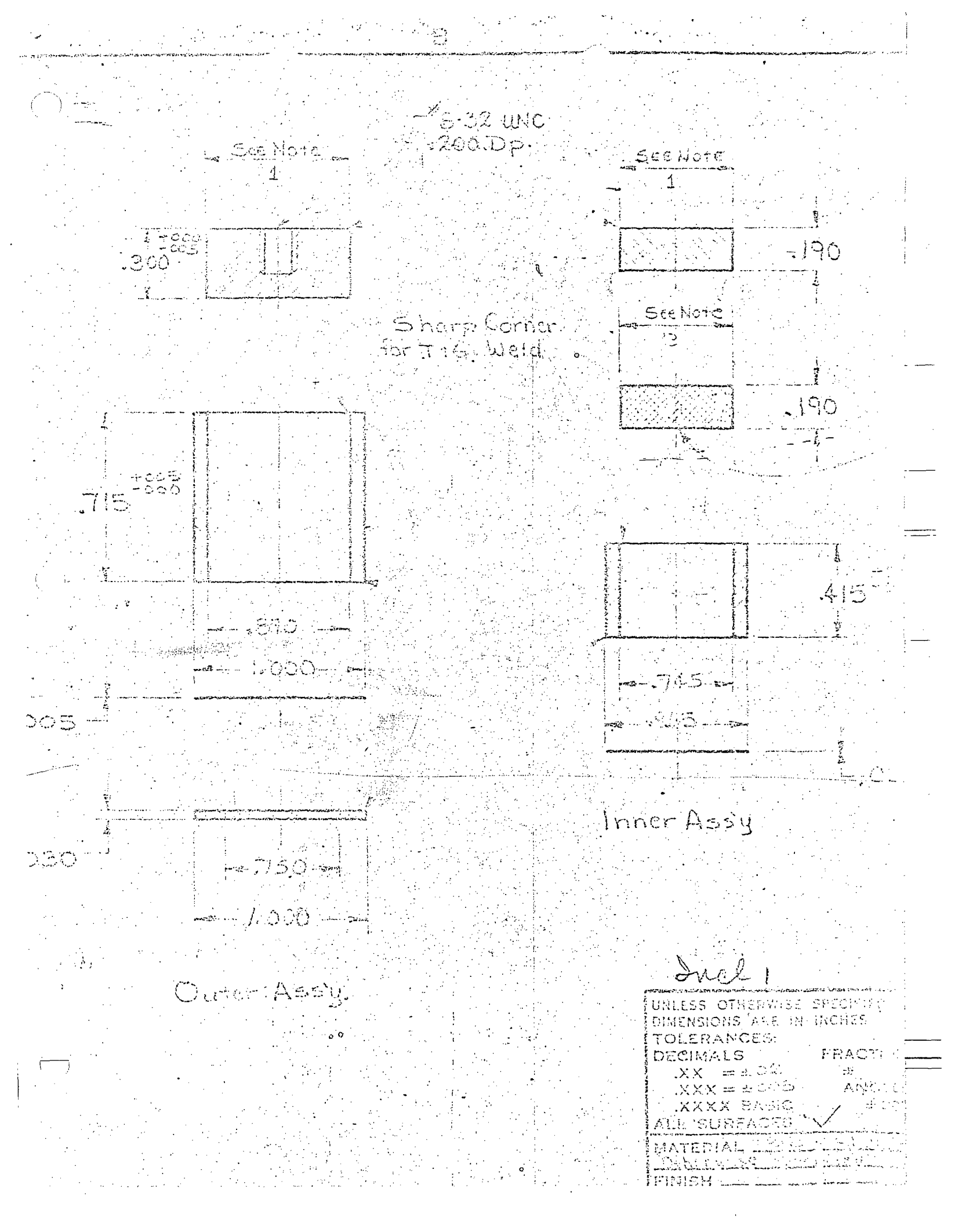
9. The device will be used by or under the supervision of individuals designated by the WRAMC Radioisotope Committee. A radiation protection survey will be performed and SOP established (Incl 6) prior to placing the unit into routine use.

10. Questions or comments pertaining to this request should be directed to the Health Physics Officer, Walter Reed Army Medical Center, IDS Code 198-5161.

FOR THE COMMANDER:

6 Incl
as

FRED C. BRAND
LTC, MSC
Adjutant


5-32 UNC
-2B DP.
See Note 1
.300
Sharp Corner for T.I.G. Weld
See Note 1
.190
See Note 2
.190
.715
.810
1.000
.415
.745
.750
1.000
Outer Assy.
Inner Assy
UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES:
DECIMALS
.XX = ±.04
.XXX = ±.010
.XXXX BASIC
ALL SURFACES
MATERIAL
FINISH

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL

SHEET OF

DWG NO.

Porous Stainless Steel

Notes

1. The fit between lid & Container on both outer & inners is to be a .0005 Slip fit
2. Clearance between Outer & Inner containers is to be .005 Nominal .002 minimum
3. The Fit Between Porous Stainless Steel Plug & Inner Container Is To Be .0005 Interference Fit

APPD		
APPD		
APPD		
APPD		
CHECKED		
DRAWN		DATE
SIGNATURE		DATE

MONSANTO RESEARCH CORPORATION
DAYTON LABORATORY
DAYTON, OHIO

Gamma Source
Model 2704

DWG NO. 2704-A000 REV

SCALE- WT. CALC ACT. CODE IDENT NO.

SHEET OF

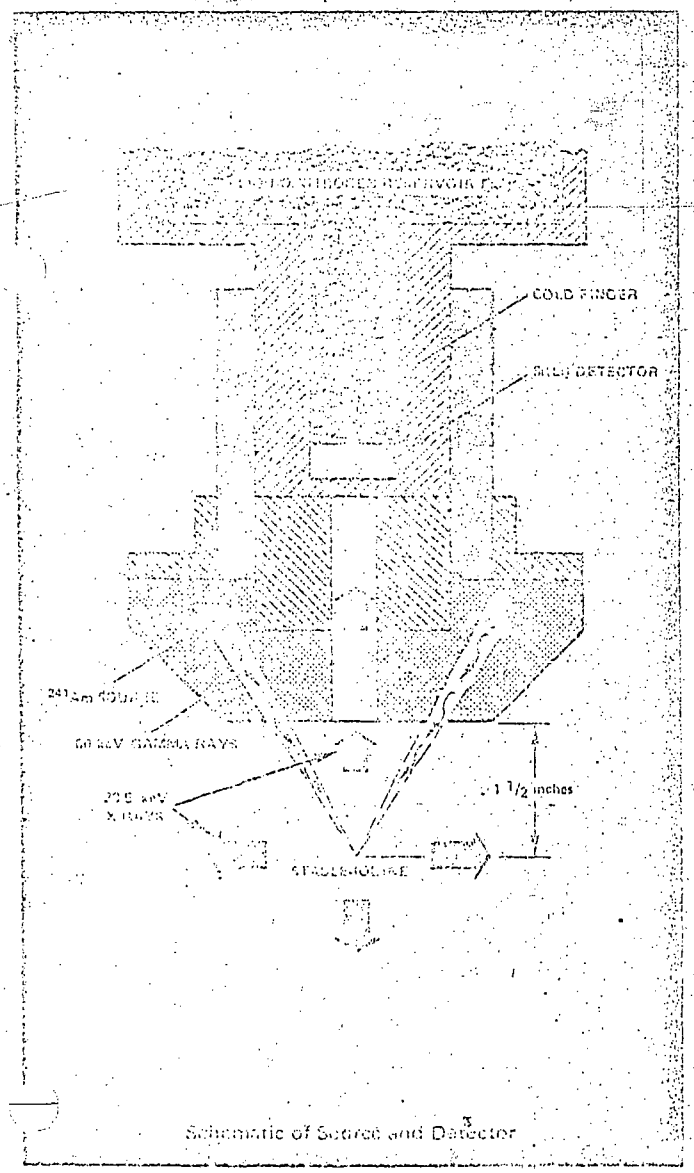
A Clinical Evaluation of the ORTEC 4820 Fluorescence Scanning System

A.B. Brill and J.A. Patton
Vanderbilt University School of Medicine, Nashville, Tennessee

Introduction

The ORTEC 4820 Fluorescence Scanning System permits the study of body functions by mapping distributions of stable isotopes within the body. In studies performed with this instrument, no radioisotopes are administered. The system consists of an annular source of ^{241}Am, a high-resolution silicon (solid-state) detector, and the specialized electronics necessary for signal processing.

The 3-inch annular source is collimated to focus at a point 1 1/2 inches from the face of the collimator. Gamma rays from the source eject electrons from the inner orbits of stable atoms in the field of view of the source collimator. This results in the production of characteristic x-ray spectra. The excellent energy resolution of the Si(Li) detector permits detection of x-rays in the presence of the scatter background. This system is optimum for mapping the stable iodine content of the thyroid gland. The $K\alpha_1$ x-ray of iodine has sufficient energy (28.5 keV) to escape the thyroid and be counted by a detector. The information obtained from the fluorescence technique is unique in that the normal stable iodine content is mapped with no external disturbances.



Schematic of Source and Detector

The diagnosis of thyroid disease is based upon analysis of physiologic, biochemical, and anatomical factors. Traditional nuclear medicine patient counting procedures provide information on the uptake and retention of radioactive tracers by the thyroid gland. With imaging systems, maps of the distribution of functional activity of different regions in the gland are obtained following administration of radioactive iodine or its congeners. Several important limitations are inherent in studies based on the traditional techniques. The radiation dose to the patient from emission scan doses is not trivial. When 50 μCi of ^{131}I is given, 50 to 100 rads is absorbed by the thyroid. When 2 mCi of ^{99m}Tc pertechnetate is used for thyroid imaging, the thyroid dose is between 200 and 1000 mrad. With the ORTEC Fluorescence Scanning System described in this report, the thyroid dose is measured at 60 mrad per procedure, and the dose to the rest of the body is essentially zero. Thus fluorescence scanning could be carried out even during pregnancy without exposing the fetus to risk from internal emitters. The resolution of fluorescence images of the thyroid is comparable to those obtained[1] with ^{131}I and hence may obviate the need for radiotracers when the clinical question relates to the size and shape of the thyroid. In patients with a flooded iodine pool from recent radioopaque-dye studies, fluorescence scanning will provide estimates of iodine content and its anatomical distribution that could not have been obtained from radiotracer kinetics in that situation. This is also true for patients who have received thyroid hormone suppression for short periods of time. Fluorescence scanning also obviates the need for TSH stimulation tests in patients with solitary functioning nodules, where it is necessary to determine whether normal thyroid tissue is suppressed in the remainder of the gland. Similarly, it is possible to distinguish between primary and secondary hypothyroidism without using TSH since iodine content is markedly diminished in the former and is unchanged in the latter situation.

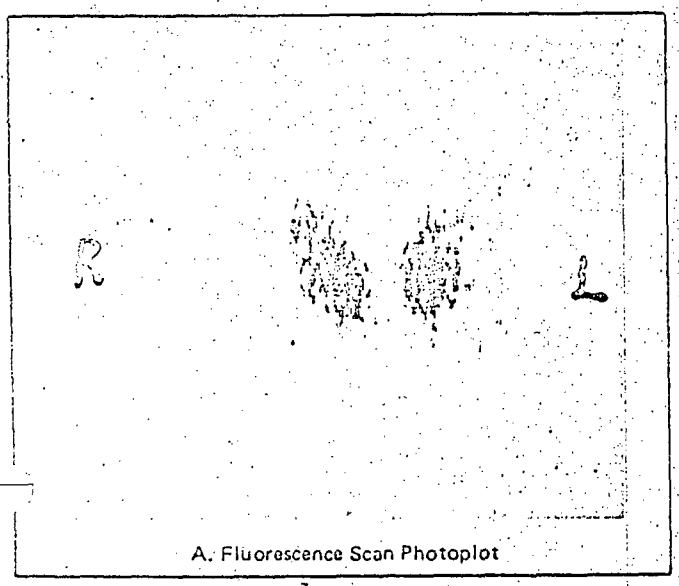
[1] P. B. Hoffer, "Clinical Results in Fluorescent Thyroid Scanning," p. 230 in *The Role of Semiconductor Detectors in the Future of Nuclear Medicine*, published by Society of Nuclear Medicine, New York, 1971.

Incl 2

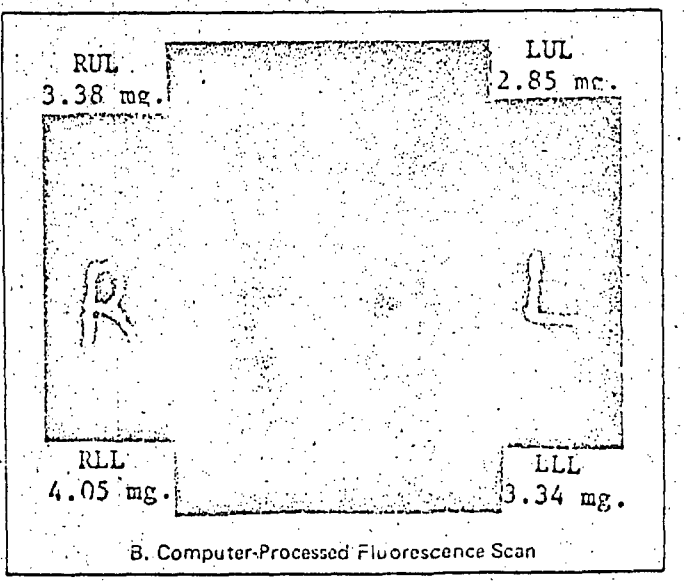
Examples of several clinical studies performed with the ORTEC System are shown as imaged on a standard display system. Computer analysis is used to quantitate iodine content and can be used to enhance image display as well. Further value may be derived from these measurements by combined regional analysis of iodine content and functional capacity. Normalization of measured function to thyroid mass is subject to great uncertainty due to the imprecision of the mass estimates. Normalization to iodine content may provide analogous information that will be clinically useful. Results of a study on a patient with a cold nodule are also presented to show the effect of combining fluorescence scanning and emission scanning.

Normal Patient

35-year-old male normal volunteer. No signs or symptoms of disease. The fluorescence scan shows that the distribution of stable iodine conforms to the normal size and shape of the thyroid gland. The amount of iodine measured in the gland was 14.1 mg; while the range of normals (3 patients) is 8.7 mg to 14.1 mg (mean = 11.1 mg). No emission scan was needed in view of the normal results obtained.



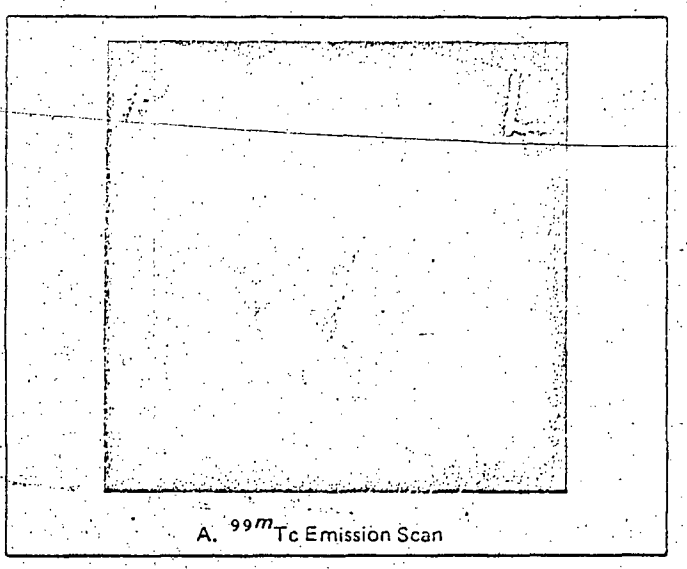
A. Fluorescence Scan Photoplot



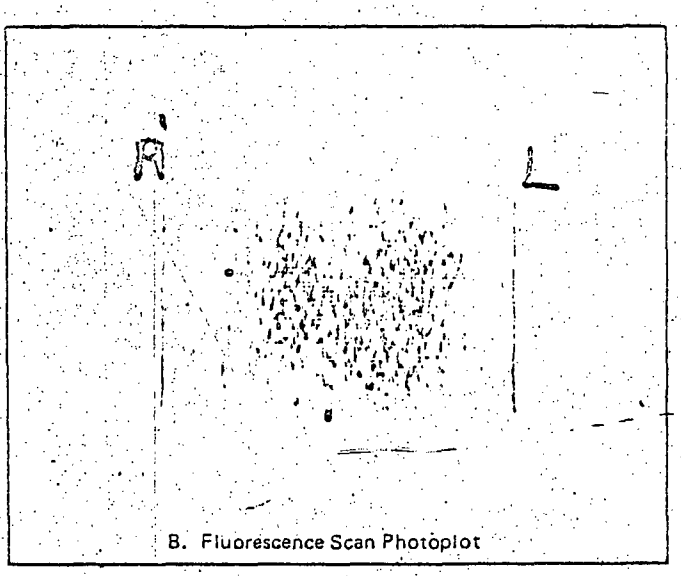
B. Computer-Processed Fluorescence Scan

Hyperthyroid Patient

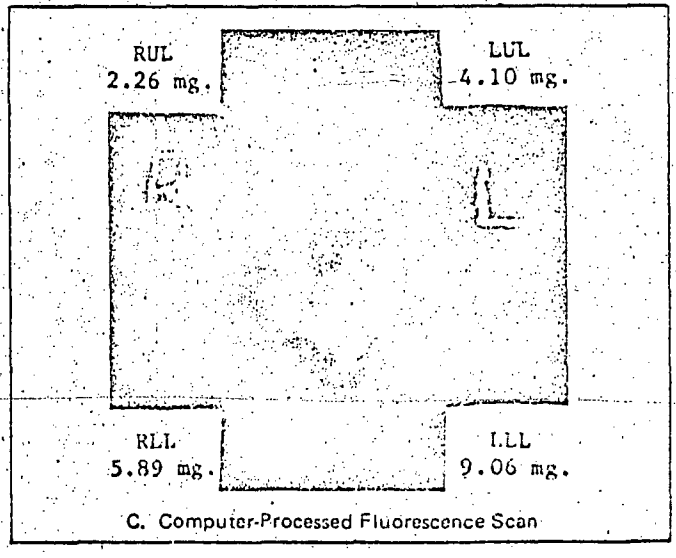
[illegible] with thyroid [illegible] and [illegible] for 6 months [illegible] ^{131}I [illegible]. Column 7%, 0.6 (normal, <10). Total [illegible] in the gland was 21.3 mg distributed as shown in the fluorescence scan image. The inset numbers indicate the iodine content in the 4 poles of the gland. Diagnosis: Graves Disease. Patient subsequently treated with 8 mCi of ^{131}I.



A. ^{99m}Tc Emission Scan



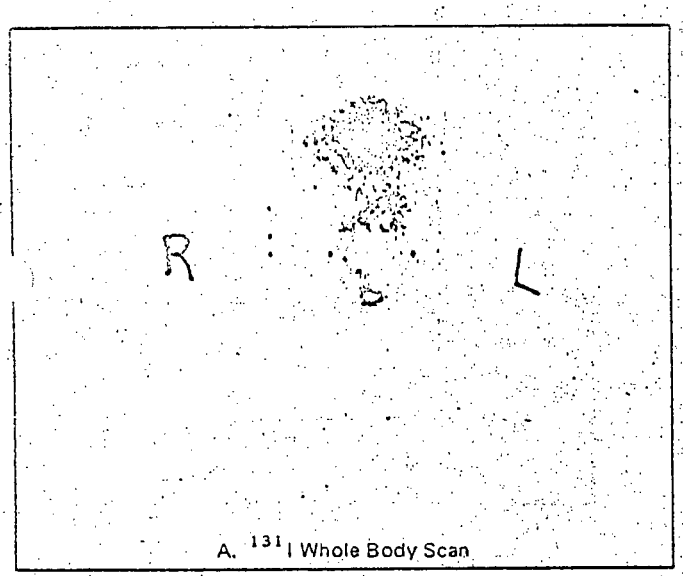
B. Fluorescence Scan Photoplot



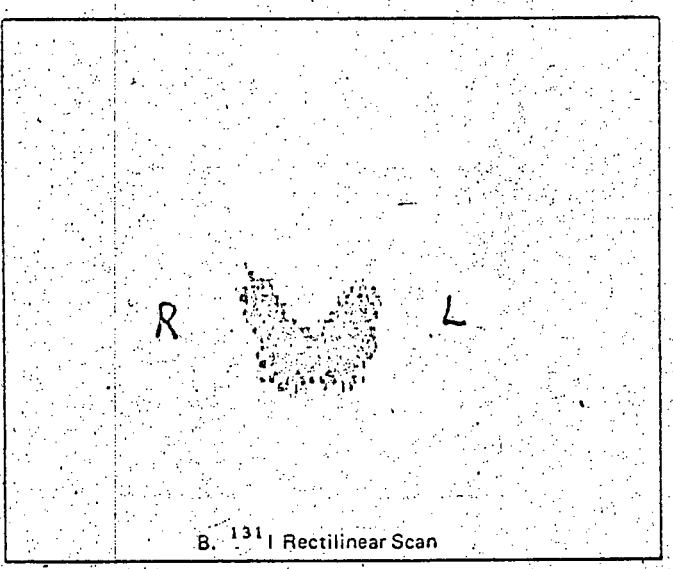
C. Computer-Processed Fluorescence Scan

Patient with Thyroid Carcinoma

42 year-old woman who had a lymph node removed from the right neck, which was found to contain adenocarcinoma of the thyroid. Due to a bleeding tendency no further surgery was attempted. A whole body ^{131}I scan revealed large amounts of ^{131}I in the [illegible] stomach, intestines, and bladder. The ^{131}I distribution is normal, whereas the camera view shows an irregularity on the lateral surface of the right lobe. The rectilinear scan reveals an increased iodine content in the right lobe with a suspicion of tumor metastasis. The difference to the 1.0 mCi ^{131}I scan [illegible] of studies could have been reversed (see scans of Picker phantoms).



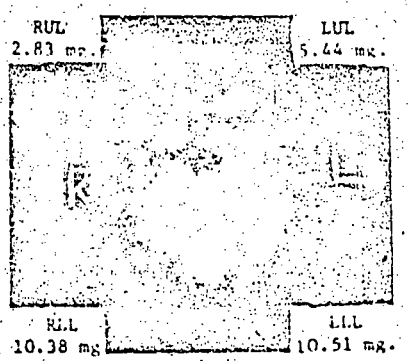
A. ^{131}I Whole Body Scan



B. ^{131}I Rectilinear Scan



C. ^{131}I Camera View



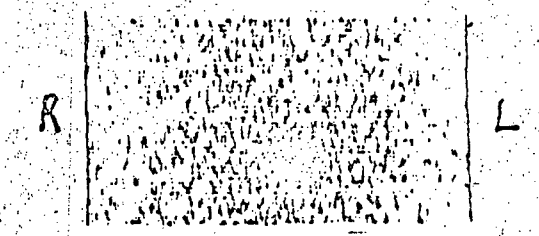
D. Computer-Processed Fluorescence Scan

Patient with Cold Nodule

52-year-old female with a thyroid nodule noted in the right neck for 3 months. The patient received thyroid hormone suppression for 1 month with equivocal results. Patient off medications for 2 weeks prior to scans. The ^{131}I uptake was 0.9% at 24 hours. Technetium camera study showed a large cold nodule in the right lobe of the thyroid. The fluorescence scan revealed a comparable distribution of stable iodine. It is not known whether it will be possible to differentiate between malignant and nonmalignant nodules with fluorescence scanning.



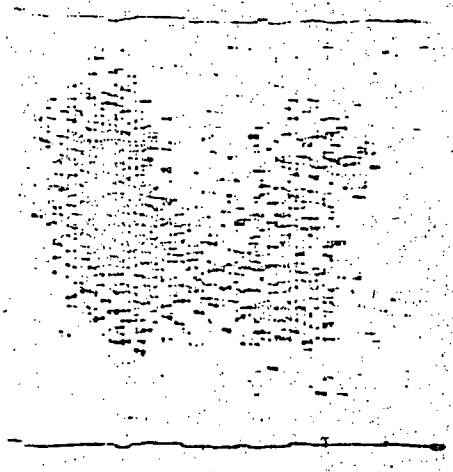
A. ^{99m}Tc Emission Scan



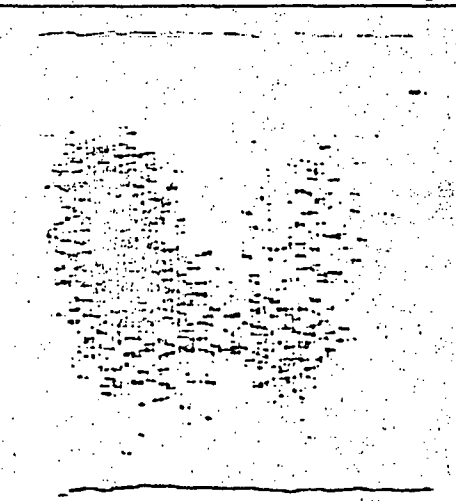
B. Fluorescence Scan Photoplot

Effect of ^{131}I Background on Fluorescence Image

A study was made to determine whether the presence of ^{131}I background would affect the image of the fluorescent scan. A [illegible] thyroid phantom containing 20 mg of iodine was scanned with the ORTEC Fluorescence Scanning System. The image obtained was compared with a scan obtained from the same phantom containing 20 mg of iodine plus 50 μCi of ^{131}I. The nonradioactive iodine in the thyroid is indistinguishable from the iodine with stable isotope alone. Identical imaging techniques were used in each instance.



A. Thyroid Phantom with 20 mg of Iodine

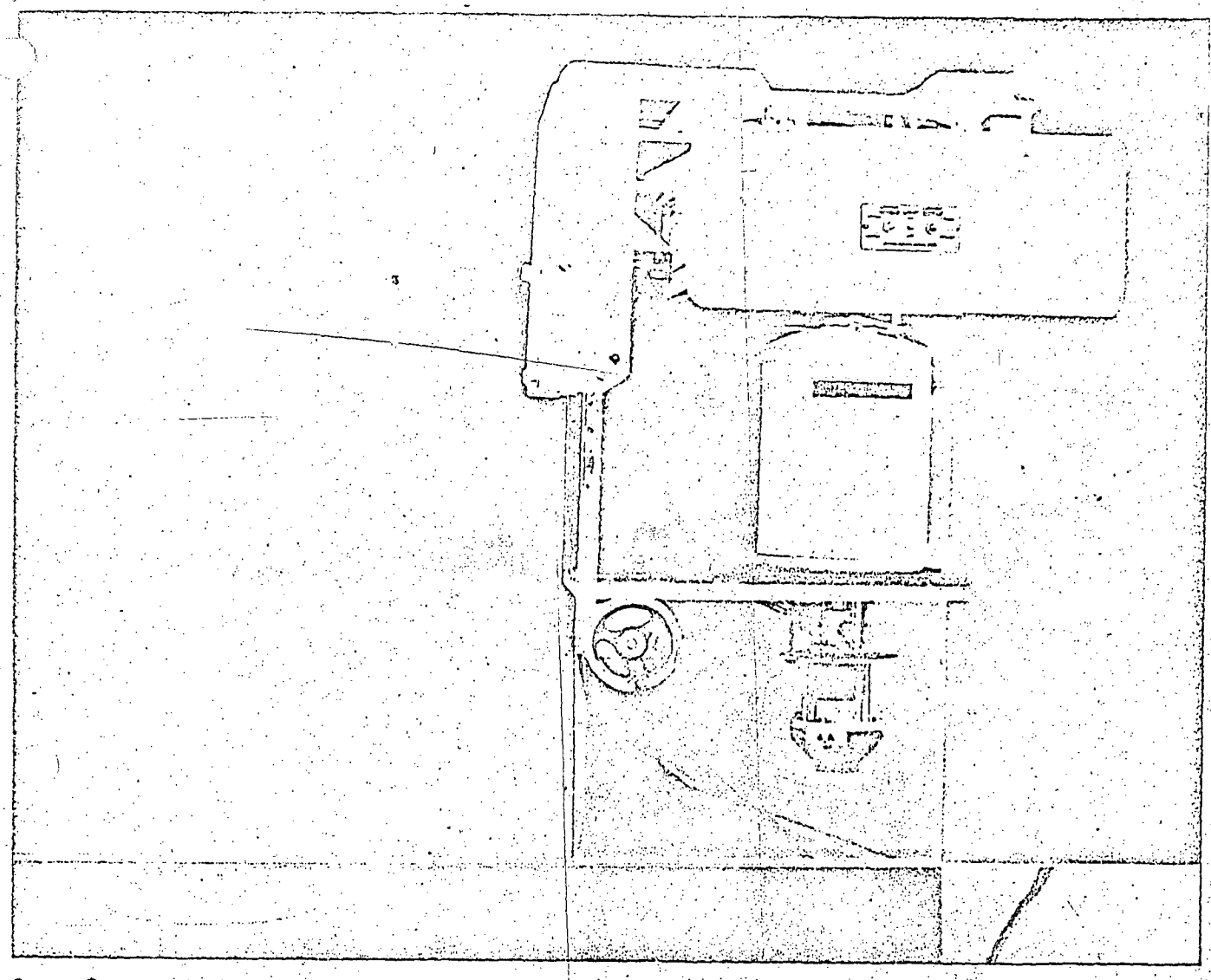


B. Thyroid Phantom with 20 mg of Iodine and 50 μCi of ^{131}I

Conclusions

These studies show that the ORTEC Fluorescence Scanning System provides a useful new technique for thyroid imaging. With this procedure the dose to the thyroid is significantly reduced and the dose to other parts of the body is eliminated. Nothing is introduced into the body for the study, and therefore only the stable iodine present in the thyroid is imaged. This system may also be useful for blood-flow studies and is certainly a useful tool for exploring new diagnostic techniques.

System Description



Source-Detector Head The excellent imaging shown in the clinical evaluations is due to the unique configuration of source and detector, a joint development of ORTEC and A. B. Brill of Vanderbilt University. It consists of a special large-volume ORTEC lithium-drifted silicon semiconductor detector with liquid nitrogen reservoir for cooling, of a sealed annular ^{241}Am source, of a special shield and collimator which focuses the source at a depth of 1 1/2 inches below the head, and of a low-noise preamplifier for the detector signal.

Electronics The energy selection requirements of the system are severe. The necessary electronics must have a precision and stability of a higher order than that of conventional scanners using scintillation detectors. The ORTEC Fluorescence Scanning System uses a preamplifier specially designed to minimize additional sources of noise t[illegible] detector and an amplifier that enhances the ig[illegible]o-noise ratio by modern pulse-shaping techniques. The single-channel analyzer precisely selects the desired characteristic x-ray from the stable iodine, rejecting scattered radiation. The digital signal produced then drives a conventional readout system. Standard NIM modular construction is employed.

Scanning Mechanism The ORTEC Fluorescence Scanner is available as a complete system, including the scanning mechanism and image presentation. Alternatively, the detector-source head and special electronics can be adapted in place of or in addition to a conventional scanning detector. The digital output of the electronics is compatible with all image presentation systems.

Your ORTEC sales representative can provide detailed information about complete Fluorescence Scanning Systems or adaptations of conventional emission scanners to fluorescence scanning.

NEW FLUORESCENCE SOURCE CONFIGURATION

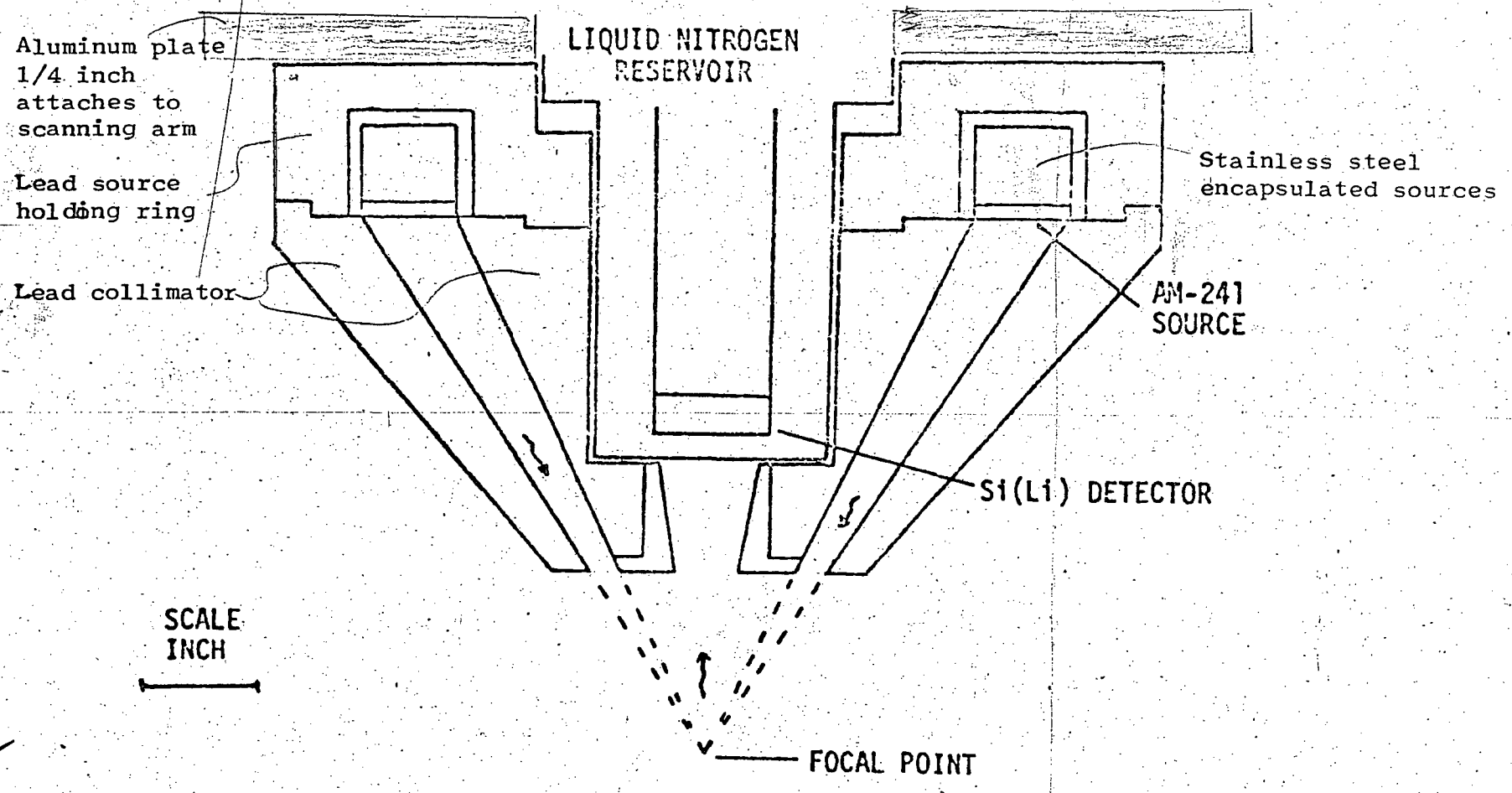
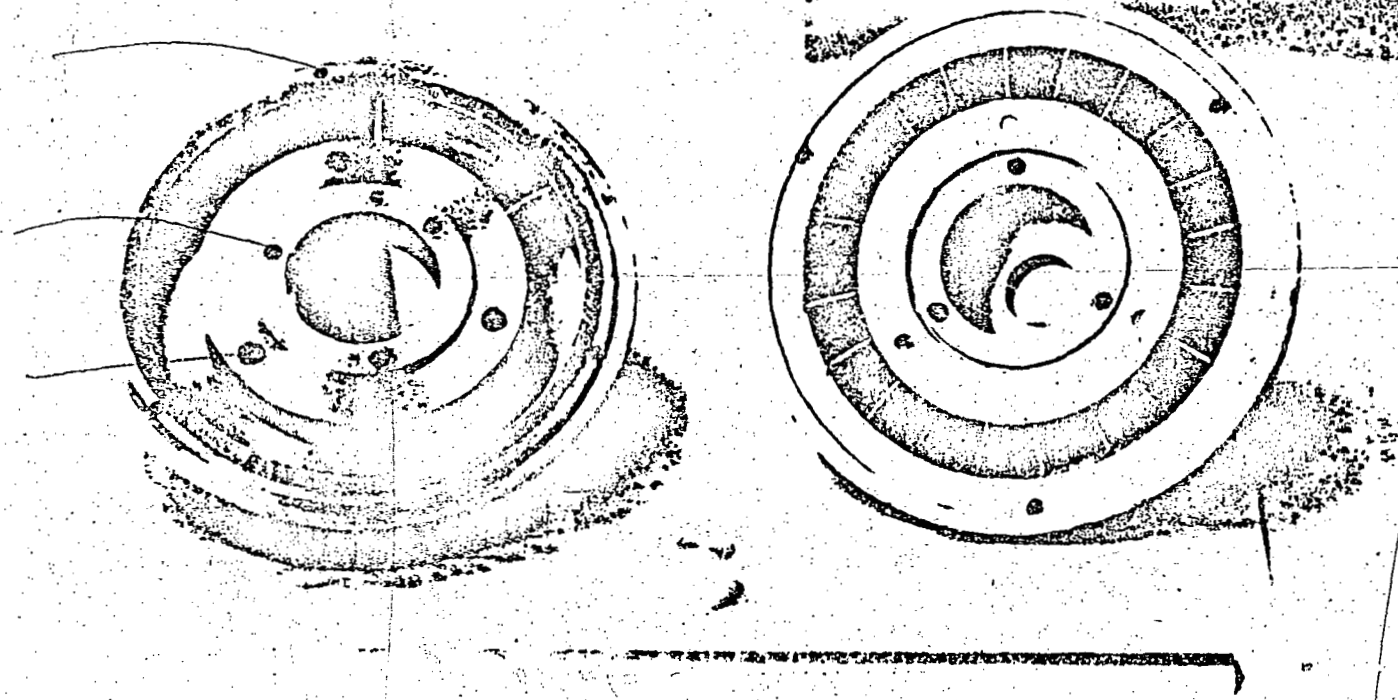


Fig 3

Three sets of three holes all of which attach to the supporting plate.

Source Holding Ring

Collimator



1) Hole orignates in collimator passes through retaining ring and through the support plate. 1/4-20 bolt is used. Collimator end is tapped. Bolt is attached above the supporting plate.

2) Hole orignates in supporting plate passes through source retaining ring into the collimator. The collimator is threaded.

3) Hole orignates in the collimator and attaches to the supporting plate.

CLASSIFICATION AND TESTING OF RADIOACTIVE SOURCE CONTAINERS

Reference: *Classification of Sealed Radioactive Sources*, by United States of America Standards Institute, Inc.

Type Source	Model Nos.	Sizes
Gamma gauge, unprotected	MRC Model #2701	0.437" diameter X 0.750" tall
	MRC Model #2705	1.125" diameter X 0.750" tall

All sources were complete except that no radioactive material was used.

VIBRATION TEST 3 - Model #2701 and 2705 were tested as specified in Sec. 8.5.1 through 8.5.3 and evaluated by leak test B2.6 and B2.9. After the sources passed B2.9 at 100 psi, the pressure was increased to 300 psi and the time was increased to 30 minutes.

Results: Two each of Model #2701 and 2705 were so tested and all sources submitted passed this test.

Testing Laboratory: Vibration Test 3 was performed by:
Bowser-Morner Testing Laboratories, Inc.
420 Davis Avenue
Dayton, Ohio 45401

Classification: MRC Model #2701 and 2705 shall be classified in test class 3 for vibration.

Tested By: Darrell E. Sevy — 11-25-69 Date

Witnessed By: Harold A. Malson — 11-25-69 Date

Witnessed By: John C. Dikeman — 11-25-69 Date

Incl 4

CLASSIFICATION AND TESTING OF RADIOACTIVE SOURCE CONTAINERS

Reference: *Classification of Sealed Radioactive Sources*, by United States of America Standards Institute, Inc.

Type Source	Model Nos.	Sizes
Gamma gauge, unprotected	MRC Model #2701	0.437" diameter X 0.750" tall
	MRC Model #2705	1.125" diameter X 0.750" tall

All sources were complete except that no radioactive material was used.

IMPACT TEST 5 - Monsanto Model #2701 and 2705 successfully passed Impact Test 4. The condition of the source container indicated that the unit could withstand Impact Test 5.

Two each of Model #2701 and 2705 were tested as specified in Sec. 8.4.1 through 8.4.3 and was evaluated by leak test methods B2.6 and B2.9. After sources passed leak test B2.9 at 100 psi, the pressure was increased to 300 psi and the time under pressure was increased to 30 minutes.

Results: Model #2701 was flattened to a diameter of 0.322 from its original diameter of 0.437. The entire case was flattened with the window wrinkled and distorted. Damage was greater than that of Impact Test 4.

Model #2705 was flattened to a diameter of 1.056" from its original diameter of 1.125". This source had a severely wrinkled window and damage was more than that done to another Model #2705 on Impact Test 4.

Both Model #2701 and 2705 passed Test B2.9.

Classification: Monsanto Model #2701 and 2705 shall be classified in test class 5 for impact.

Summary: Monsanto Model #2701 and 2705 were selected to represent the minimum and maximum sizes in the 2701 through 2705 series. We therefore classify other sources within the size range and with the same container wall and window thickness, the same as the units tested. The addition of a flange or mounting plate shall not change the classification provided the wall thickness is not reduced in any way.

Tested By: Darrell E. Sevy — 11-25-69 Date

Witnessed By: Harold A. Malson — 11-25-69 Date

Witnessed By: [illegible] — 11-25-69

CLASSIFICATION AND TESTING OF RADIOACTIVE SOURCE CONTAINERS

Reference: *Classification of Sealed Radioactive Sources*, By United States of America Standards Institute, Inc.

Type Source	Model Nos.	Sizes
Gamma gauge, unprotected	MRC Model #2701	0.437" diameter X 0.750" tall
	MRC Model #2705	1.125" diameter X 0.750" tall

All sources were completed except that no radioactive material was used.

TEMPERATURE TEST 5 - Model #2701 and #2705 were tested as specified in Sec. 8.2.1 through 8.2.3 and evaluated by leak test methods B2.6 and B2.9. After sources passed B2.9 at 100 psi, the pressure was increased to 300 psi and the pressurization was increased to 30 minutes.

Results: Two each of Model #2701 and #2705 were so tested and all sources submitted passed this test.

Observation: This test produced some minor scale and oxide formation on the outside of the case. The .005" window was wrinkled and the entire case turned brown.

Classification: MRC Model #2701 and #2705 shall be classified in test class 5 for temperature.

Summary: Monsanto Model #2701 and #2705 were selected to represent the minimum and maximum sizes in the 2701 through 2705 series. We therefore classify other sources within this size range, with the same basic internal construction using the same materials and the same or heavier window thickness, the same as the units tested. The addition of a flange or mounting plate shall not change the classification provided the wall thickness is not reduced in any way.

Tested By: Darrell E. Sevy 12-18-69
Darrell E. Sevy Date

Witnessed By: Harold A. Malson 12-18-69
Harold A. Malson Date

Witnessed By: Howard Dufour 12-18-69
Howard Dufour Date

Appendix B. Leak Test Methods

)endix is not a part of the USA Standard on Sealed Radioactive Sources. It is included for informative nd as a guide to promote uniformity of practice to meet the objectives of the standard.)

B1 GENERAL

a of the radioactive material within the rce is the criterion for determining that a ets the specifications of a particular class t test. Therefore, testing for the presence ive material on the exterior of a sealed ter it has been subjected to a test, is a determining whether the source has ful- requirements of the test or has failed the

ough testing for the presence of radioactive n the exterior of a sealed source is man- production sources, it is not always the o use for prototype sources when the spec- of a particular configuration are being de-

methods of leak testing are acceptable to whether a sealed source meets or fails the ions of a test. Not all the listed leak-test re applicable to all sources. The test most a particular source configuration should

ral, sealed sources which have an internal me of less than 0.25 cc. should be tested by ore of the following tests:

B2.1 wipe test
B2.2 immersion test
B2.3 lithium chloride leach test

sources which have an internal void volume han 0.25 cc. may be tested by using any of ods described in sections B2.4 through 2.10 lates to sections B2.1, B2.2, and B2.3. ternal void volume shall include all void thin the outer sealed enclosure. When porous ds are substituted for the radioactive material, space in the porous compound shall constitute the total void volume. For doubly encapsu- irces, the total void volume shall include the ce between the inner and outer capsules.

2 ACCEPTABLE LEAK TEST METHODS

Wipe (Smear) Test. Wipe all external sur- the source thoroughly with a piece of filter r other suitable material of high wet strength orbent capacity, moistened with a solvent ill not attack the material of which the outer s he source are made and which, under the conditions of this test, has been demonstrated to be effective in removing the radionuclide involved. Measure the total activity on the paper. If it is less than 0.005 microcurie, the source shall be consudered to be free from surface radioactive contamination.

Store the source for at least 7 days and repeat the test. If the total activity on the wiping material is less than 0.005 microcurie, the source shall be considered leak free.

B2.2 Immersion Test. Immerse the source in a solvent which will not attack the material of which the outer surfaces of the source are made and which, under the conditions of this test, has been demonstrated effective in removing the radionuclide involved. Heat the solution to 50 ± 5 C. and hold it at this temperature for 4 hours. Remove the source and measure the total activity in the liquid. If the activity in the liquid is less than 0.005 microcurie, the source shall be considered leak free.

B2.3 Lithium Chloride Leach Test

B2.3.1 Procedure. When leak testing source capsules by this procedure, replace 20% of the volume of the source compound or chemical analog being used as a substitute for the radioactive material with reagent-grade, anhydrous, 200-mesh lithium chloride. Blend the mixture thoroughly before using it in fabricating the source. In any case, where it is impractical to blend the lithium chloride with the substitute source compound, place a volume of lithium chloride not less than one-half the calculated free volume inside the capsule adjacent to the substitute source compound.

Place the source capsule in a vacuum flask. Add a known volume of distilled water (not less than 15 ml.) of known lithium content to cover the source capsule completely.

Evacuate the flask to 22 to 25-in. Hg and hold for 5 minutes. At the end of 5 minutes, vent the flask to the atmosphere. Repeat this vacuum-venting procedure four times.

Remove the source capsule slowly, allowing the water to drain back into the vacuum flask.

Reduce the volume of the leach water to 10 milliliters by boiling. If the volume drops below 10 milliliters, correct it to 10 milliliters by dilution with distilled water.

Analyze the water from the previous step for lithium content by using an analytical tech-

Incl 5

ure of the leak tester shall not exceed
n for at least 5 minutes with the throttle
v open. The leak detectors shall be
ble to a reading of at least 8 to 10 leak-
meter full-scale deflections when a 1.4 x
standard cubic centimeters per second
standard leak is used.
ile the vacuum system is being calibrated,
oughing pumps shall be isolated from the
m, and the standard leak placed at the
est point from the leak detectors. After
ration, the leak should be valved off. The
n calibration readings shall be 10% or less
leak calibration level in 5 minutes.
e pieces tested shall be free of dirt,
se, burrs, etc., which would tend either to
defects or to damage the pressure and vac-
fittings.
ak testing shall be performed in well-ven-
ed areas to minimize the possibility of de-
ng helium-contaminated air.
ne vacuum system, exclusive of the vacuum
mber, shall be kept under a continuous dy-
ic vacuum.

3.4 Testing of Source

P 8.4.1. Before each finished source
sl bly is tested, the following blank
sts shall be performed.
Source-assembly background shall be de-
ermined by testing a solid bar of the same
imensions and material and with approxi-
ately the same configuration as the source
ssembly. The bar is to be subjected to the
reviously described pressurization before
t is leak tested.

B2.8.4.2. Place the finished source as-
sembly inside the vacuum chamber.

B2.8.4.3. Evacuate the chamber and be-
gine monitoring when the system pressure
falls within the range of the leak detector.
Use a maximum leak-detector internal pres-
sure of 0.1 micron and set the instrument
for maximum sensitivity. The required pro-
cedure is to crack open the throttling valve
on the leak tester when the system vacuum
reaches 5 microns or less. A full open
throttle is made only if the leak tester vac-
uum can be maintained below 0.1 micron.

B2.8.4.4. If helium signals that are
greater than background but less than 1 x
10^{-6} standard cubic centi ers per second
of helium are given after you have continu-
ously pumped and tested with an open throt-
tle valve for 1 minute, isolate the chamber
from the vacuum pumps and accumulate any
helium for 30 minutes. Monitor chamber
following the procedure described in the pre-
ceding step.

B2.8.5 Data Required. Record the magni-
tude of leak indication for each of the following:

a. Chamber background.

b. Solid-bar background, after 1 minute and
after 30 minutes.

c. Each of the finished source assemblies
after 1 minute and after 30 minutes.

If c is less than b or equal to or less
than 1 x 10^{-8} standard cubic centimeters
per second of helium, consider the source
leak free.

B2.9 Helium Pressurization Bubble Test

B2.9.1 Procedure. Place the source capsule
in a suitable pressure chamber and pressurize
the chamber with helium gas to 100 pounds per
square inch gauge. The capsule shall remain un-
der pressure for 15 minutes.

Release the pressure, remove the capsule
from the chamber and submerge it in liquid
(water, alcohol, or acetone) 2 inches below the
fluid level.

Observe for positive indication of leaks by the
evolution of bubbles from the source-capsule
surface. If no bubbles are observed for 5 min-
utes, consider the source capsule leak free.

B2.9.2 Equipment Specifications. The pres-
sure chamber shall have a volume of at least
twice that of the source capsule and at least five
times the free volume inside the source. The
viewing chamber may be of any size and shape
provided that it is large enough to submerge the
source capsule completely under a minimum of
2 inches of fluid. It shall be made of a colorless,
distortion-free, transparent material.

B2.10 KR-85 Test.‡ Place the source in a con-
tainer and fill the container with Kr-85 to a pressure
of at least 2 atmospheres for at least 10 minutes.
Evacuate the container, let it stand for at least 5 min-
utes, and sample the container for the presence of Kr-
85.

‡C. L. Ottinger, USAEC Rpt. ORNL-TM-1504,
Oak Ridge National Laboratory.

Standard Operation Procedure

Fluorescence Scanning System

1. Routine use and operation of the unit will be limited to persons authorized by the Chief of the Nuclear Medicine Service.

2. The following procedure will be used in setting up a patient:

   a. Position the patient on the scanning table.
   b. Insure that the scanner is ready to process the information.
   c. Open the shutter.
   d. Upon completion of the scan, close the shutter.
   e. Assist the patient from the treatment table.

3. The unit will be inspected by a medical physicist at least once a week for mechanical and electrical faults.

Incl 6

HEALTH PHYSICS
WALTER REED ARMY MEDICAL CENTER
WASHINGTON, D.C. 20012

MEDEC-YHP
*SOP
Number 2-5

19 December 1972

HEALTH PHYSICS CALIBRATION RANGE

1. Purpose.

a. To insure the safe operation and control of the Health Physics Calibration Range by delegating responsibilities to specific sections at Health Physics, WRAMC.

b. To outline the routine and emergency procedures to be followed by Health Physics personnel at the calibration range.

2. Scope. This SOP pertains to all personnel entering the Health Physics Instrument Repair and Calibration Facility.

3. Responsibilities.

a. The Chief, NL&TS Branch, HP, WRAMC, is responsible for:

(1) Control, safe operation, and security of the calibration range.

(2) Ensuring that the range is used only for those purposes approved by WRAMC Radioisotope Committee, and the HPO.

(3) Ensuring that authorized persons are familiar with calibrating sources.

(4) Ensuring that this SOP, WR 40-10, and any other pertinent Instructions are posted in the HP Instrument Repair and Calibration Facility.

(5) Ensuring a personnel dosimetry program, to include at least one whole body film badge and one wrist film badge, for all persons who use the calibration range is in effect.

(6) Ensuring that the Health Physics calibration range will be used only by, or under the supervision of those individuals so designated by the WRAMC Health Physics Officer.

b. The Chief, R&S Branch, HP, WRAMC, is responsible for:

(1) Ensuring that leak test of the sources and routine radiation protection surveys are made in the HP Instrument Repair and Calibration Facility.

*This SOP supersedes SOP Number 2-5, 21 June 1971

(2) Maintaining the WRAMC Authorization for the Health Physics Instrument Repair and Calibration Facility"s use of radioactive materials.

(3) Initiating all correspondence reports with USAEC concerning the license governing instrument section sources or their use on the calibration range.

(4) Calibration of ^{137}Cs Range.

c. Authorized operators of the calibration range are responsible for:

(1) Using the calibration range in the safest manner at all times.

(2) Knowing and understanding the contents of WR 40-10, this SOP, and any other pertinent regulations prescribed by the Health Physics Officer.

(3) Securing all sources when not in use.

(4) Maintaining a log of the operation time of the calibration range.

(5) Providing calibration & routine maintenance of the Victoreen Model 444 (or equivalent) survey instrument used as a secondary calibration standard.

(6) Immediately reporting any accident, malfunction, or other unplanned occurance to the Health Physics Officer (X5107 or X5161).

4. Operating Procedures.

a. Before using the calibration range, note the reading of the Area Monitor located in the center of the range. If it reads 1 mR/hr or more, immediately notify HPO (X5107).

b. Insure that the fail safe system in operational. Set mechanical timer to no longer than 30 minutes.

c. While working on the calibration range continually monitor the radiation field with a Victoreen Model 808 B Area Monitor, or equivalent.

d. All personnel will wear a $\beta\gamma$ wrist and a $\beta\gamma$ whole body film badge as well as a self-reading pocket dosimeter when working around or with the calibration range.

e. When using the ^{137}Cs Irradiator, at least two operators must be present. Extreme caution will be observed to avoid unnecessary personnel exposure from the primary beam.

f. All sources should be secured immediately after use.

g. Log in the exposure for each source.

5. Emergency Procedures.

a. In the event of fire the following persons shall be notified and the following action taken.

(1) Fire Dept., Forest Glen (X5317)

(2) Health Physics Officer (X5107)

(3) The senior individual will clear all other persons from the area, attempt to secure the sources, and attempt to extinguish the fire if practical.

b. In the event of a power failure secure all sources.

6. Special Operating Conditions.

a. Following a fire or other incident, the calibration range will not be used until a radiation survey has been conducted by Health Physics.

b. Under No circumstances shall explosives or flammable materials be irradiated.

c. Under No circumstances shall the calibration range be used for purposes other than calibration of WRAMC Instruments without the prior written consent of the HPO, WRAMC.

d. After duty hours, the calibration sources will be locked, the instrument shop will be locked and both sets of keys will be kept in the key cabinet in Room 3, Bldg 188, forest Glen Section.

7. References.

a. WRAMC Regulations 40-10.

VANDY L. MILLER
LTC, MSC
Health Physics Officer
WRAMC

SUPPLEMENT H

TECHNICAL PROCEDURES IN NUCLEAR MEDICINE SERVICE

1. TP NM-1, Technical Procedure for Assay of 99-Mo Contamination

2. TP NM-2, Radiopharmaceutical Testing and Quality Control

3. TP NM-3, Technical Procedure for Radiation Protection

4. TP NM-4, Technical Procedure for Dose Calibration

nn/n/h

NUCLEAR MEDICINE SERVICE
DEPARTMENT OF RADIOLOGY
WALTER REED ARMY MEDICAL CENTER

Technical Procedure
Number-NM1

DEC 2 1973

TECHNICAL PROCEDURE FOR ASSAY OF ^{99}Mo CONTAMINATION OF ^{99m}Tc

1. PURPOSE: This technical procedure provides a method for the determination of 99Mo content and the calibration of 99mTc for human use.

2. INSTRUMENTATION: The thyroid uptake system consisting of a 2 x 2 inch Sodium Iodide (th) crystal probe and a scintillation spectrometer will be used for all measurements.

3. QUALITY CONTROL: Routine practice has been established for daily checks of voltage calibration, linearity, efficiency and background.

4. MATERIALS: The lead "pig" labeled "For use in determining 99Mo contamination in 99mTc" should be used. This pig has side wall shielding of 2.5 cm of lead. The 137Cs standard source calibrated as 113.7 microcurie of 99Molybdenum is used as a standard.

5. PROCEDURE: (step 1) Set spectrometer settings for 99Mo
Gain: 8
Base: 600
Window: 200

(step 2) Place assay pig beneath the thyroid probe at a distance 5cm from the face of the collimator with the center of the assay pig aligned with the center of the collimator. (step 3) Take 5 serial counts of 2 minutes each and average. Enter in assay log as 2 minutes background counts. (step 4) Place the collecting vial containing the total 99mTc eluate (at least 25 millicuries) in the assay pig. Position as for step 2.

(step 5) Take 5 serial counts of 2 minutes each and average. Enter in assay log as 2 minutes 99Mo counts. (step 6) Remove collecting vial and replace with 137Cs standard. Collect 5 serial 2 minutes counts and average. Enter in assay log as 2 minute standard counts.

(step 7) Calculations:

$$99\text{Mo Activity} = \frac{AxBx6.3}{\frac{C}{D}}$$

Where A= net cp2m of 99mTc sample
B= activity of 137Cs sample in microcuries
C= net cp2m of 137Cs standard
6.3= conversion factor 137Cs activity to equivalent 99Mo activity
D= number of millicuries of 99mTc in collecting vial

If the assay reveals more than 1 uCi of 99Mo in 1 mCi of 99mTc, or more than 5 uCi of 99Mo per dose, the material will not be given to humans.

99mTc Assay. The assay for 99mTc will be done in the mediac dose calibrator set for 99mTc. Total activity will be noted and entered with volume in the Radiopharmaceutical RP log.

MERRILL C. JOHNSON, MD
Colonel, MC
Chief, Nuclear Medicine Service

NUCLEAR MEDICINE SERVICE
WALTER REED ARMY MEDICAL CENTER
Washington, D.C. 20012

*TECHNICAL PROCEDURE
NO. NM2

RADIOPHARMACEUTICAL TESTING AND QUALITY CONTROL

1. PURPOSE. To establish general procedures for the routine testing of radiopharmaceuticals at WRAMC.

2. Radiopharmaceuticals manufactured or compounded for human use will be prepared under the supervision of the Chief, Nuclear Medicine Service. Control numbers will be assigned to each batch produced and quality control records and appropriate control samples will be maintained.

3. Stock solutions used in compounding radiopharmaceuticals are prepared in the I.V. Section of the hospital pharmacy using pyrogen tested chemicals, sterilized by membrane filtration, gas or autoclaving and tested for pyrogenicity and sterility by U.S.P. methods. Stocks are identified by lot numbers and are shown by lot, when used for compounding in the radiopharmacy log book.

4. Testing for assay, identity, quality and purity will be accomplished prior to patient administration. When possible, sterility and pyrogenicity testing of parenterally administered products will be accomplished prior to administration to humans. If prior testing for sterility and pyrogenicity is not possible because of short half-life, testing will be accomplished after administration. Upon presentation of a statement signed by the administering physician attesting that a medical emergency exists, with the concurrence of the Chief, Nuclear Medicine Service, a radiopharmaceutical normally tested for sterility and pyrogenicity may be administered prior to such testing.

5. Not less than six trial batches of new radiopharmaceutical products or new methods of production will be completely tested prior to administration to humans.

6. Radiopharmaceuticals for oral administration will be routinely or periodically tested for sterility and pyrogenicity when deemed appropriate by Chief, Nuclear Medicine Service.

7. The United States Pharmacopoeia (USP) prescribed method of sterility and pyrogenicity testing will be used.

8. Testing for assay, identity, quality, and purity of a radiopharmaceutical when not prescribed by the USP will be in keeping with best practices. This may include, but is not limited to pH, clarity, odor, volume, specific activity, chemical analysis, pharmacological effectiveness, liquid scintillation counting, gamma spectroscopy, 4 pi beta counting, dose calibration by free air ionization chamber technique, and total dose integration.

*THIS TECHNICAL PROCEDURE SUPERSEDES SOP No. 3-R-1, WRAMC, DATED 14 OCT 69.

9. Products containing radioisotope labelled ("tagged") compounds will be tested by radiochromatography to determine the location of the radioisotope and percent bonding.

10. Test producers for individual radiopharmaceuticals will be included in the protocols submitted to the WRAMC Radioisotope Committee for approval.

The following radiopharmaceuticals are compounded in the Radiopharmacy Section, Nuclear Medicine Service, WRAMC.

Technetium-99m Sulfur Colloid
Technetium-99m Macroaggregated Albumin
Technetium-99m Human Serum Albumin
Technetium-99m Diethylenetriaminepentaacetic Acid
Technetium-99m Polyphosphate

Merrill C. Johnson

MERRILL C. JOHNSON, MD
Colonel, MC
Chief, Nuclear Medicine Service

NUCLEAR MEDICINE SERVICE
DEPARTMENT OF RADIOLOGY
WALTER REED ARMY MEDICAL CENTER

Technical Procedure
Number-NM3

30 MAY 1974

TECHNICAL PROCEDURE FOR RADIATION PROTECTION

1. PURPOSE: The purpose of this technical procedure is to show the placement of shielding within the hot lab to provide adequate radiation protection.

2. STORAGE CAVE: The storage cave consists of a lazy susan type storage area divided into 4 segments per shelf. There are 4 shelves for a total of 16 segments. In front of the lazy susan there is a stainless steel cabinet 32 in depth and 36" high. The cabinet is backed by 1 1/4 inch of lead shielding and 1/16th inch of steel. The sides and top of the storage are made of concrete six inches thick and protrude into an unoccupied area with no pedestrian traffic. The top of the cabinet is 32x40." The lazy susan is operated by remote control by a 3 way switch located in front of the cave. When not in use, the lazy susan is placed in its lowest position to provide maximum shielding.

3. GENERATOR STORAGE: A wall of lead bricks (2x8 inches) shall extend end to end across the cave entrance on top of the cabinet. This wall shall be ten inches in height and divided into 2 sections, by a lead wall extending from the outer wall towards the lazy susan. A lead sleeve of 3/4inch thickness shall be provided to house the most recently received generator. The older generator will be placed behind that sleeve and held one week, and then sent to health physics

for disposal. No more then 2 generators will be on hand at any one time.

4. FUME HOOD: A storage well, consisting of lead bricks will be fabricated of sufficient size for storage of radiopharmaceuticals prepared for daily use. This well should be 10 inches in height by 2 inches thick. The dimensions of the well should be flexible.

5. QUALITY CONTROL: To ensure adequate radiation protection, readings from a model E-120 Geiger counter should not exceed 1 mr/hr at the face of the shielding.

6. MONITORING: WRAMC Health Physics personnel will make periodic checks to ensure compliance with appropriate regulations.

Merrill C. Johnson

MERRILL C. JOHNSON, M.D.
COLONEL MC
Chief, Nuclear Medicine Service

NUCLEAR MEDICINE SERVICE
DEPARTMENT OF RADIOLOGY
WALTER REED ARMY MEDICAL CENTER

Technical Procedure Number-NM4 — 31 May 1974

TECHNICAL PROCEDURE FOR DOSE CALIBRATION

1. PURPOSE: This technical procedure describes the methodology for preparing and calculating the dosage for radiopharmaceuticals.

2. MATERIAL HANDLING: All vials containing radioactive materials used in the manufacturing of radiopharmaceuticals will be placed in lead pigs.

3. PERSONNEL HANDLING: Personnel handling radioactive materials will wear disposable plastic gloves, wrist film badge and a whole body film badge.

4. CALCULATING ACTIVITY: The procedure for calculating the eluted fractions of 99mTechnetium is described in Tech Procedure NM1. The 99mTechnetium used in compounding radiopharmaceuticals will be first measured in the Mediac Dose calibrator set at 99mTc X 10. Immediately following compounding the finished product will again be assayed in the dose calibrator. The radiopharmacist will then calculate the specific activity and note in the RP log the activity per milliliter and the time of assay.

5. INDIVIDUAL DOSES: The technologist preparing individual doses will first note the radiopharmaceutical to be used and the activity prescribed on the patient prescription card. He will then use the dosage record portion of the prescription card to arithmetically calculate the amount required in milliliters. After drawing up the desired amount, he will place the syringe in the Mediac dose calibrator set at the required setting. The reading should

be within plus or minus 2% of the calculated dose.

6. QUALITY CONTROL: The Mediac dose Calibrator will be calibrated daily using the ^{57}Cobalt source on ^{99m}Tc setting (the net reading, gross minus background, should be 186 ± 10%) and the ^{137}Cs source on ^{137}Cs setting (the net reading should be 0.205 ± 10%). If the values for either setting are outside of 10% range, a serviceman should be notified to recalibrate the instrument.

NOTE: As the ^{57}Cobalt source has a half-life of 270 days, the 208 figure should be corrected for decay. This reading was obtained on 31 May 1974. All corrections should be from this date.

Merrill C. Johnson

MERRILL C. JOHNSON, M.D.
COLONEL MC
Chief, Nuclear Medicine Service

REGION I Form 198-C
(July 82)

08-01738-02 Irradiator

LICENSE NO: 08-01738-03 Type A B.S. Med

DOCKET NO. (s) 030-01317
030-06895

PAGE 1 OF

ATTACHED
- ☐ Appendix A
- ☐ Appendix B
- ☐ Appendix C
- ☐ Memo

INSPECTION REPORT NO. 88-01

Walter Reed Army Medical Center
Department of the Army
Washington, D.C. 20012

LICENSEE CONTACT: Telephone No:

LICENSE NO: 08-01738-02 Irradiator CATEGORY PRIORITY:
08-01738-03 Medical CATEGORY PRIORITY:
CATEGORY PRIORITY:

INSPECTION DATE (s): TYPE OF INSPECTION: ☐ SPECIAL ☐ ANNOUNCED ☐ ROUTINE ☐ UNANNOUNCED ☐ DAYSHIFT ☐ OTHER

SUMMARY OF FINDINGS AND ACTION

- ☐ NO NONCOMPLIANCE, CLEAR 591 ISSUED
- ☐ NO NONCOMPLIANCE, LETTER
- ☐ NONCOMPLIANCE, APPENDIX A
- ☐ ACTION ON PREVIOUS NONCOMPLIANCE, APPENDIX B
- ☐ NONCOMPLIANCE, 591 ISSUED
- ☐ SUPPLEMENTAL INFO, APPENDIX C

RECOMMENDATIONS
SEE BASIS IN APPENDIX C

- ☐ CHANGE CATEGORY TO:
- ☐ NEXT INSPECTION DATE:
- ☐ CHANGE PRIORITY TO:

PERSONS CONTACTED

Information in this record was deleted in accordance with the Freedom of Information Act, exemptions 2 & 6
FOIA-2006-0238

INSPECTOR: John Pelchat

APPROVED: John F. Glenn

Portions Ex. 2 & 6 MM 16

REGION I Form 198-C.1
(July 82)

IOB - Medical

INSPECTION PLAN AND REPORT NUMBER 88-01 Page 1 of _____

Plan Approved: _____ Date: _____

Licensee: Walter Reed Army Medical Center License No. _____

Inspection Items	Scheduled for Inspection	Post Inspection Status	Module No.
Management Meeting - Entrance and Exit Interviews (Required)	-		30703B
Program Requirements, MC 2860 (Required)			78710B
Followup on Noncompliance and Deviations			92702B
Independent Inspection Effort (Required)			92706B
Transportation			86740B

INSPECTION REPORT NUMBER _____ Page ____ of ____

7871DB - Medical

AREAS INSPECTED AND FINDINGS

Licensee: _____ License No: _____ Amendment No: _____

	INSPECTION ITEMS	CRITERIA	FINDING
1.	Organization	Lic Cond _____	_____
	Structure of organization as described in requirements?	Major Gerald Connock RSO Major Terry Minton Nuclear Pharmacist	
	Scope of Program? Patient load?	Bldg 2 35-40 patients/day Tc (85%) 13 wk Th G367 I-131 diag uptake 2-3 wk oral soln 2-3 therapy (30mCi) In 111 WBC I-125 C-51 RIA Laboratory 2 P-32 therapy >30 I/month	
	NOTES & REMARKS:	2-3 brachytherapy proc/month 2 Tc 99 7.45 Ci gen	
2.	Licensee Internal Audits	Lic Cond _____	_____
	Scope and frequency of audits as required?	Weekly surveys by RSO & Staff. Reviewed by	
	Conducted by appropriate persons?	NCOIC (Noncomm officer in charge) Audited RSO	
	Records maintained?		
	Reviewed by management?	Problem findings result in contact by RSO	
	Deficiencies identified and corrected?	Yes	
	NOTES & REMARKS:		
3.	Training and Qualification of Personnel	Lic Cond _____	_____
	Training & retraining conducted as required?		
	Written & oral exams conducted?		
	Examination results reviewed by management?		
	Instructions to workers per 19.12?	19.12	
	Authorized users? On license? Available in emergency?	Lic Cond _____	
	NOTES & REMARKS:		
4.	Radiation Protection Procedures	Lic Cond _____	_____
	Procedures available and implemented? Identify radiopharmaceutical and dose(s)? Cover handling of patients receiving therapeutic doses? Cover handling of cadavers?	Rad/Pharm labeled as req. Patient proc. IDed by spelling last name	
	Close out Surveys on Patients receiving temporary implants?	35.14 (b)(5)(v)	
	Emergency procedures for spills, etc? Personnel understand procedures?		
	NOTES & REMARKS:		

INSPECTION REPORT NUMBER _____ Page _____ of _____

87710B - Medical

AREAS INSPECTED AND FINDINGS

Licensee: _____ License No: _____ Amendment No: _____

INSPECTION ITEM	CRITERIA	FINDING
5. Use of Materials		
Procurement and use as required? Authorized form & route of administration?	35.14(b)	Yes only authorized uses of RAM
Special tests (moly breakthrough, leak tests, etc) required?	35.14(b)(4)	No records incomplete & but backup records show testing performed as required
Inventory of brachytherapy sources? Combined w/ leak test records performed @ req frequency	35.14(b)(5)	
Dose calibration checks performed? Linearity tests performed as required. All results within ±5%. Accuracy tests performed w/ NBS sources every 6 months. Geometry tests results available		
Posting & labeling as required? All syringes & vials labeled as required	20.203	
NOTES & REMARKS:		
6. Storage of Materials		
Material secured in both restricted and unrestricted areas? Adequately?	20.207	
NOTES & REMARKS: Research areas ~~are locked~~ have access control ID & badges required. Staff challenges non-routine personnel		
7. Facilities	Lic Cond_____	
As described in lic cond or application?		
Any changes made? Adequacy?		
NOTES & REMARKS:		
8. Instruments	Lic Cond_____	
Survey meters & instruments adequate for program?		Appropriate instrumentation available
Instruments & meters operable? Calibrated? Calibration adequate?		Yes Yes
NOTES & REMARKS:		

AREAS INSPECTED AND FINDINGS

Licensee: _____ License No: _____ Amendment No _____

INSPECTION ITEMS	CRITERIA	FINDING
9. Receipt and Transfer of Material		
Written procedures for pickup, receiving, opening packages? Yes	20.205	Complete tracking system on PC
Survey of packages when received? Yes	20.205(c)(1)	for tracking receipt of RAM compares receipt vs with limits
Records of survey of packages? Yes	20.401(b)	
Transfer of materials proper? Transfer records maintained? Only returns to vendors	30.41, 30.51	Licenses of RAM receivers maintained
Authorized containers used? Shipping papers & package labels proper for packages on hand? Yes	71.5	Note - under timely renewal Quadrex in FL expired 6/30/85
NOTES & REMARKS:		
10. Personnel Protection - External		
Personnel monitoring controls adequate? Yes Exposures minimized? - Yes for RAM users	20.101, 20.202	
Exposure records (NRC-4 or 5) maintained? Available for employee review?	20.102(b), 20.401(a)	One reported overexposure 1.8 RWBE 1.7 ext for 3/1-4/4/87. Was investigat by RAD staff. User suspended pending result. Determined to be result of storage of dosimetry in vicinity of P-32 for 2 wks; not a real expo Complete documentation
Surveys conducted? Adequate? Yes Yes	20.201	
Records of monitoring, surveys?	20.401	
Levels in unrestricted areas within limits? (Particularly around nuclear med. hot lab rooms of brachytherapy patients)	20.1, 20.105	
NOTES & REMARKS:		
11. Personnel Protection - Internal		
Airborne concentrations in restricted areas? (Xe-133, patients treated with I-131)	20.103	No assay for C14 or H3
Exposures to minors? No minors	20.104	Reg. min sen I125 0.4 nCi I131 0.8 nCi
Posting of airborne radioactivity areas?	20.203(d)	Investigational 12 nCi 6 nCi
Survey, monitoring bioassay adequate for airborne radioactivity, surface contamination? Records maintained?	20.201 20.401	
Procedures for use of Xe-133 followed? - Closed Xe handling system checked weekly		
NOTES & REMARKS: Room under - pressure evaluated 6 mo		

AREAS INSPECTED AND FINDINGS

Licensee: _____ License No: _____ Amendment No: _____

INSPECTION ITEM	CRITERIA	FINDING
12. Effluent Controls, Waste Disposal		_____
Release of effluents contolled? (particularly Xe-133, radioiodine where used)	20.106, 20.33	
Waste disposals controlled?	20.301, 20.303, 20.304, 20.305	
Procedures, records maintained?	20.401, Lic Cond_____	
Surveys made? Adequate?	20.401	
NOTES & REMARKS:		
13. Notifications and Reports		C
To individuals? None other than routine	19.13	
Overexposures, excessive levels & concentrations, incidents? No	20.403, 20.405	System for notifying under when ALARA or investigational limits exceeded. Several interviewed individuals aware of prev investigations
Personnel exposures and monitoring, termination reports? None required	20.407, 20.408	
Theft or loss of licensed material? No	20.402	
Misadministrations? yes as required see notes	35.41-35.45	
NOTES & REMARKS:		
14. Posting of Notices		C
Part 20, license & documents, procedures, notice of violations posted?	19.11(a)	
NRC-3 posted?	19.11(c)	Very numerous postings
NOTES & REMARKS:		
15. Other License Conditions		_____

AREAS INSPECTED AND FINDINGS

Licensee: _____ License No: _____ Amendment No: _____

INSPECTION ITEMS	CRITERIA	FINDING
16. Confirmatory Measurements		

NRC Instrument: L-16 L-14 a Calibration Due Date: _____

L-16 28000 cpm w/std

17. Independent Inspection Effort		
18. Incidents and Events		
Any incidents of misadminstrations, contamination, etc., not otherwise covered by reports?	35.41 -35.45 20.402, 20.403, 20.405	

(July 82)

INSPECTION REPORT NUMBER _____ Page _____ of _____

APPENDIX A - DOCUMENTATION OF NONCOMPLIANCE

Licensee: _____ License No: _____

Reference	Basis for noncompliance
Report item _____ 10 CFR 20.205(b)(c) & 20.401(a) Lic Cond _____ Type n/c _____	
Report item _____ 10 CFR _____ Lic Cond 20 Type n/c _____	
Report item _____ 10 CFR _____ Lic Cond _____ Type n/c _____	
Report item _____ 10 CFR _____ Lic Cond _____ Type n/c _____	
Report item _____ 10 CFR _____ Lic Cond _____ Type n/c _____	
Report item _____ 10 CFR _____ Lic Cond _____ Type n/c _____	

(July 82)

INSPECTION REPORT NUMBER _____ Page _____ of _____

APPENDIX B - LICENSEE ACTION ON PREVIOUS INSPECTION FINDINGS

Licensee: _____ License No: _____

Identification and summary of action taken	Status
Report No: 86-01 Type n/c: 10 CFR 20.201 Describe: Failure to perform adequate survey RAM in trash Action taken:	OPEN CLOSED
Report No: 86-01 Type n/c: 10 CFR 20.201 Describe: Failure to perform adequate survey No F.B. for mm Action taken:	OPEN CLOSED
Report No: 86-01 Type n/c: 10 CFR 20.201 Describe: Failure to perform adequate survey No ext dosim. for P-32 use Action taken:	OPEN CLOSED
Report No: 86-01 Type n/c: Tiedown cond. Describe: No lab coat in nuc med lab Action taken: Observed 3 different techs wearing lab coats	OPEN CLOSED
Report No: 86-01 Type n/c: Tiedown cond Describe Failure to wear assigned dosm Action taken:	OPEN CLOSED
Report No: 86-01 Type n/c: Tiedown cond. Describe Failure to use syringe shield Action taken: Observed	OPEN CLOSED

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(July 82)

INSPECTION REPORT NUMBER _____ Page _____ of _____

APPENDIX C - SUPPLEMENTARY INFORMATION

Licensee: _____ License No: _____

( ) Uncorrected/repeated noncompliance ( ) Unresolved items

( ) Unusual occurrence, conditions, etc ( ) Inspector's comments

( ) Basis for change of Category or Priority

Open item from prev. inspection (cont'd)
Report 86-01 Failure to conduct bioassay of individual using ≥1 mCi I-125

CLOSED

Open item (LER) Diagnostic Misadministration - misadmix of Tc 99m-O_4 instead of prescribed Tc 99m MD Due to "lapse of SOP" Seperate partitions used to seperate pharmaceuticals. Failed to return O_4 to partition Then drew dose. Briefed tech staff on procedures. Developed alternate procedures to identify Tc solns using different size vials. Reviewed during inspection; preventative & corrective actions appear complete Item closed for this inspection

Major General Lewis A [redacted] MC

C.O. Mdogne [redacted]

↑

James E. Haslinga

Radiation Control Committee - Deputy Commander Clinical Services, WRAMC

Walter Connock Health Physics Officer

WRAMC 5000 military emp
5000 civilian emp

↑

Health Physics Officer

operations
day to day operations
inspections labs
reactive
bioassay support
therapy support
wipe collected

Tech Services
ALARA
dosimetry
dosimetry eval
Monitoring instr.
wipes counted
Training

Radioactive Material Control
Receipt & distribution of RAM
Confirming authorization
6 month audits of program

Initial Training 16 hours
Recurrent training Annual frequency

COL Jay Anderson Chief of Nuclear Medicine
COL Nasser Ghaed Chief of Dept of Radiology

On site police & fire services

Fort Dietrich

Billy G Bass Director of Instrumentation (202)576-

Cs 137 - small animal 350 irrad pro / year

Co 60 - small animal EXP

List of authorized users Bass will operate system for ocean & new users

No transfer receipt or disposal of RAM

Ustal McNall

Minton

Glaser ~~gas Box~~

Bill Beckwith RRO

Hazard Biologicals

H3 C14 S35 I125 In111

All animal no human use

30-40 auth users ~~100~~ 100-150 people work w/ RAM C x-ray

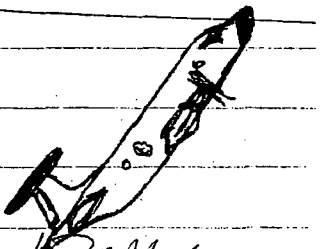
5 authorizations including 1 for irradiator - 1 principle user

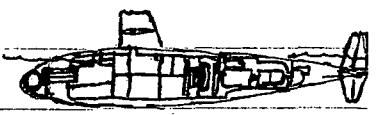
Institutional RSC for program → non-human use → RCC

Order RAM receipt survey

116 labs

Lab surveys perf. mnthly





Steve Tobery

Iod ⇔ Bromsay

I said it was good for me.

Bioassay Tobery Procedure	8/4/86	Bioassay	8/12/86
	5/5/86		5/6/86
Merril @	4/22/88	Bioassay	~~4/26/88~~
	4/19/88		
	4/15/88		
	4/12/88	prob after bioassay	4/12/88
	3/14/88		3/8/88
	2/19/88		2/9/88
	1/13/88		1/26/88

Ronneburg No bioassay since 1/24/88

No records for receipt surveys

Peter Petradis

Ex 4

2 NEN containers
5 iododeoxyuridine 500 μCi I-125 cat # NEX 072 031638 Day 127 assay date 8/14/78
Sodium iodide 2 mCi NEZ 0331 8/4/78 027256 day 123
Previous owner was chemist for local cancer treatment group
Current owner been in home for 4 years
Survey w/ L-14C & L-16 analyzer all background readings
L-16 checked w/ mock iodine 125 source
Advised that disposal as normal trash would be appropria

REGION I Form 198-D
(July 82)

INDUSTRIAL - ACADEMIC

LICENSE NO: _____

DOCKET NO. (s) _____

PAGE _____ OF _____

ATTACHED
- ☐ Appendix A
- ☐ Appendix B
- ☐ Appendix C
- ☐ Memo

INSPECTION REPORT NO. _____

Walter Reed Army Medical Center
Department of the Army
Washington, DC 20012

LICENSEE CONTACT: _____ Telephone No: _____

LICENSE NO: _____ CATEGORY _____ PRIORITY: _____

_____ CATEGORY _____ PRIORITY: _____

_____ CATEGORY _____ PRIORITY: _____

INSPECTION DATE (s): _____ TYPE OF INSPECTION:
- ☐ SPECIAL ☐ ANNOUNCED
- ☐ ROUTINE ☐ UNANNOUNCED
- ☐ DAYSHIFT
- ☐ OTHER

SUMMARY OF FINDINGS AND ACTION

- ☐ NO NONCOMPLIANCE, CLEAR 591 ISSUED
- ☐ NO NONCOMPLIANCE, LETTER
- ☐ NONCOMPLIANCE, APPENDIX A
- ☐ ACTION ON PREVIOUS NONCOMPLIANCE, APPENDIX B
- ☐ NONCOMPLIANCE, 591 ISSUED
- ☐ SUPPLEMENTAL INFO, APPENDIX C

RECOMMENDATIONS
SEE BASIS IN APPENDIX C

- ☐ CHANGE CATEGORY TO: _____
- ☐ NEXT INSPECTION DATE: _____
- ☐ CHANGE PRIORITY TO: _____

PERSONS CONTACTED

INSPECTOR: John Peldhit

APPROVED: John E. Glenn

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(July 82)

77710B - Industrial - Academic

INSPECTION PLAN AND REPORT NUMBER _____ Page _____ of _____

Plan Approved: _____ Date: _____

Licensee: _____ License No. _____

Inspection Items	Scheduled for Inspection	Post Inspection Status	Module No.
Management Meeting - Entrance and Exit Interviews (Required)			30703B
Program Requirements, MC 2850 (Required)			77710B
Followup on Noncompliance and Deviations			92702B
Independent Inspection Effort (Required)			92706B
Transportation			86740B

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INSPECTION REPORT NUMBER _____ Page ____ of ____

777108 - Industrial - Academic

AREAS INSPECTED AND FINDINGS

Licensee: _____ License No: _____ Amendment No: _____

INSPECTION ITEMS	CRITERIA	FINDING

1. Organization — Lic Cond ____

Management organization? Radiation Control Committee WRAMC

Radiation Protection Organization? Hospital Nuc Med Therapy; VA Army WRA Institute of Research WRAIR; Armed Forces Institute Pathology

Scope of Operation? 5000 military employees, 5000 civilian employees; ~500 people are badged, ~200 with RAM

NOTES & REMARKS: 85-90 principal users have RAM authorization. All procedures must have formal protocols. 1st use of protocol is observed & then obs periodically - Protocols approved by RCC

RCC Membership: Nuc Clinical depts using RAM: Surgery, Medicine, Radiology, AFIP, WRAR, Safety

2. Licensee Internal Audits — Lic Cond ____

Scope and frequency? RCC receives RSO reports 1/4ly & written annual report

Management controls? Labs are visited weekly or monthly dependent on scope. Labs have survey. Should survey find problem lab notified

NOTES & REMARKS: Problems refer to materials control. RSO has provisional approval for some non-human use

Human use committee reviews all in-vivo

3. Training and Instructions to Employees

Training program, scope and frequency, retraining? Lic Cond ____

Required tests administered; scores satisfactory? Yes

Instructions to workers? 19.12

NOTES & REMARKS: Basic principles of Rad Protection course req. for all new personnel w/ specific treatments. Training annually general every five years

4. Radiation Protection Procedures

Operating & emergency procedures implemented? Lic Cond ____

Security? 20.207

NOTES & REMARKS:

5. Materials, Facilities and Instruments

Authorized uses and quantities? Lic Cond ____

Restricted areas, posting requirements? 20.203

Survey instruments & dosimeters; operable, properly calibrated?

NOTES & REMARKS:

AREAS INSPECTED AND FINDINGS

Licensee: _____ License No: _____ Amendment No: _____

INSPECTION ITEM	CRITERIA	FINDING
6. Receipt and Transfer of Materials		_____
Procedures implemented, adequate?	20.205, 71.51	
Transfer of byproduct material?	30.41	
Control of source material,	40.51, 40.64, 70.42, 70.51, 70.53, 70.54	
Labeling and packaging?	71.5, 49CFR 170-189	
Records of receipt, transfer, storage, survey, and monitoring?	30.51	
Procedures for pickup, receipt, monitoring of packages?	20.205(b)&(c)	
NOTES & REMARKS:		
7. Personnel Protection - External		_____
Personnel monitoring control; minimize exposures, control of accumulated dose?	20.101, 201.102, 20.202	
Surveys conducted, adequate?	20.201	
Records of monitoring, surveys, disposals?	20.401, Lic Cond_____	
Levels in unrestricted areas?	20.1, 20.105	
NOTES & REMARKS:		
8. Personnel Protection - Internal		_____
Airborne concentrations in restricted areas?	20.103	
Exposure of minors?	20.104	
Posting of airborne radioactivity areas?	20.203	
Survey, monitoring bioassay requirements; records?	20.201, 20.401	
Leak tests of sealed sources?	Lic Cond_____	
NOTES & REMARKS:		

AREAS INSPECTED AND FINDINGS

Licensee: _____ License No: _____ Amendment No: _____

INSPECTION ITEM	CRITERIA	FINDING
9. Effluent Control, Waste Disposal		
Release of effluents?	20.106	
Waste disposal, proper packaging for shipment?	20.301, 20.303, 20.304, 20.305	
Procedures, records?	20.401, Lic Cond _____	
NOTES & REMARKS:		
10. Transportation		
Management controls, audits?		
Selection of packaging?	49 CFR 173.393-5, 10 CFR 71	
Preparation of packages for shipment? Filling and loading, closing, liquids? Markings & labelling? Monitoring?	49 CFR 172, 173 49 CFR 172.300 49 CFR 172.402, 403 49 CFR 173.393	
Shipping papers, loading and placarding of vehicles?	49 CFR 172.200	
Reports of Incidents?	49 CFR 171.15, 171.16	
Training program?		
Examination of packages?		
NOTES & REMARKS:		
11. Notifications and Reports		
To individuals?	19.13	
Overexposures, excessive levels and concentrations, incidents?	20.403, 20.405	
Personnel exposures and monitoring, termination reports?	20.407, 20.408	
Theft or loss of licensed materials?	20.402	
NOTES & REMARKS:		

INSPECTION REPORT NUMBER _____ Page _____ of _____

777108 - Industrial - Academic

AREAS INSPECTED AND FINDINGS

Licensee: _____ License No: _____ Amendment No: _____

INSPECTION ITEM	CRITERIA	FINDING
12. Posting of Notices		_____
Part 20, license & documents, procedures, notice of violations?	19.11(a)	
NRC-3?	19.11(c)	
NOTES & REMARKS:		
13. Environmental Monitoring Program	Lic Cond_____	_____
Implementation of program, scope and frequency as required? Sewer sampled once per year		
Records maintained, reviewed by management?		
NOTES & REMARKS:		
14. Emergency Preparedness	Lic Cond_____	_____
Procedures available for incidents and accidents?		
Training for personnel; coordination with supporting groups and agencies?		
NOTES & REMARKS:		
15. Other License Conditions		_____
NOTES & REMARKS:		

INSPECTION REPORT NUMBER _____ Page _____ of _____

777108 - Industrial - Academic

AREAS INSPECTED AND FINDINGS

Licensee: _____ License No: _____ Amendment No: _____

INSPECTION ITEM	CRITERIA	FINDING
16. Confirmatory Measurements		
Licensee's surveys verified on sampling basis?	201.105, 20.201	

NOTES & REMARKS:

NRC Instrument: _____ Calibration due date: _____

17. Independent Inspection Effort

NOTES & REMARKS:

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(July 82)

INSPECTION REPORT NUMBER _____ Page _____ of _____

APPENDIX A - DOCUMENTATION OF NONCOMPLIANCE

Licensee: _____ License No: _____

Reference	Basis for noncompliance
Report item _____ 10 CFR _____ Lic Cond _____ Type n/c _____	
Report item _____ 10 CFR _____ Lic Cond _____ Type n/c _____	
Report item _____ 10 CFR _____ Lic Cond _____ Type n/c _____	
Report item _____ 10 CFR _____ Lic Cond _____ Type n/c _____	
Report item _____ 10 CFR _____ Lic Cond _____ Type n/c _____	
Report item _____ 10 CFR _____ Lic Cond _____ Type n/c _____	

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(July 82)

INSPECTION REPORT NUMBER _____ Page _____ of _____

APPENDIX B - LICENSEE ACTION ON PREVIOUS INSPECTION FINDINGS

Licensee: _____ License No: _____

Identification and summary of action taken	Status
Report No: _____ Type n/c: _____ Describe: _____ Action taken:	OPEN CLOSED
Report No: _____ Type n/c: _____ Describe: _____ Action taken:	OPEN CLOSED
Report No: _____ Type n/c: _____ Describe: _____ Action taken:	OPEN CLOSED
Report No: _____ Type n/c: _____ Describe: _____ Action taken:	OPEN CLOSED
Report No: _____ Type n/c: _____ Describe _____ Action taken:	OPEN CLOSED
Report No: _____ Type n/c: _____ Describe _____ Action taken:	OPEN CLOSED

REGION I Form 198-D.F
(July 82)

INSPECTION REPORT NUMBER _____ Page _____ of _____

APPENDIX C - SUPPLEMENTARY INFORMATION

Licensee: _____ License No: _____

( ) Uncorrected/repeated noncompliance

( ) Unusual occurrence, conditions, etc

( ) Basis for change of Category or Priority

( ) Unresolved items

( ) Inspector's comments

Iodinations - 2 mCi/vial
1 mCi/use

I 125 Procedure performed 4/26/88 1 mCi
Bioassay not performed til 5/3

200,000 cpm @ lead face

JP Olson - collect & segregate waste org & ~~liq~~ acq liq
long & short $t_{1/2}$ solids

~~Audits~~
~~Survey Records~~
Daily Nuc Med Surveys

Quarterly Radiation Control Committee
Adequate representation of depts on committee

Medical Center. RSO office is in Bldg. 41 located just south of Medical Center Bldg.

APPENDIX G

NOTE: All areas indicated in field notes are not required to be addressed during each inspection

NOTE: Any reference to patient is intended to include human research subject

MEDICAL BROAD-SCOPE INSPECTION FIELD NOTES
Region I

Inspection Report No. 98-001

License No. 08-01738-02 (BMAA) 08-01738-03 (IRRADIATOR)

Licensee (Name & Address):
DEPARTMENT OF THE ARMY
WALTER REED ARMY MEDICAL CENTER
WASHINGTON, DC 20307-5001

Docket No. 030-01717
030-06895

Licensee Contact Col. William B. Johnson

Telephone No. (202) 356-0058

Last Amendment No. 69 (BMAA) 23 (IRRADIATOR)

Date of Amendment 3/24/97 (BMAA) 6/30/95 (IRRADIATOR)

Priority: 1/3
Program Code 2110/35510

Date of Last Inspection 2/11-2/17/97 (BMAA) 5/2/95 (IRRADIATOR)
Date of This Inspection 2/11-2/13/98

Type of Inspection:
( ) Announced
(✓) Routine
( ) Initial
(✓) Unannounced
( ) Special
(✓) Reinspection

Summary of Findings and Action:
(✓) No violations, ~~Clear 591~~ CLEAR LTR issued
( ) Violation(s), 591 issued
( ) Violation(s), Regional letter issued
( ) Followup on Previous violations

Information in this record was deleted in accordance with the Freedom of Information Act, exemptions 2
FOIA-2006-0238

Were non-cited violations identified during this inspection? ( ) Y (✓) N

Was proprietary information reviewed by or received by the inspector? ( ) Y (✓) N

Inspector _____ (Signature) Date 2/18/98

Approved M. Shanbaky (Signature) Date 3/23/98

PORTIONS EX 2 NN 1/7

ORGANIZATIONAL STRUCTURE

US Army Medical Command (MEDCOM) → Center for Health Promotion & Preventive Medicine (CHPPM)

↓

North Atlantic Regional Medical Command
General Berger

↓

Walter Reed Army Medical Center
Brig. General Michael Kussman
Commanding Officer

↓

Col. John Pierce, Deputy Commander for Clinical Services (DCCS) and Chair, Radiation Control Committee

↓

Col. Mary F. Vaeth, Chief, Preventive Medicine and member of Radiation Control Committee

↓

Col. William Johnson, Radiation Protection Officer ← — — Consulting relationship

The licenses issued to WRAMC cover clinical operations in the Medical Center (Bldg. 2); research operations in Bldgs. 40, 41, & 54 on the Walter Reed post; research operations at the Forest Glen site; and research operations in Rockville at the Taft Court and Gillette Bldg. locations. Bldgs. 40, Forest Glen, Taft Court, and Gillette are under the Walter Reed Army Institute of Research (WRAIR). Bldg. 54 is under the Armed Forces Institute of Pathology (AFIP). Research at WRAIR and AFIP under Walter Reed licenses even though these organizations do not report to MEDCOM. AFIP and WRAIR are "tenants" at WRAMC and are therefore under WRAMC licenses.

1. INSPECTION HISTORY ( ) N/A Initial inspection

A. Violations were identified during the last two inspections or two years—whichever is longer (✓) Y ( ) N

B. Response letter(s) or 591(s) dated 2/14/97 (basic) + 5/2/97 (radiation)

C. Open violations from previous inspections:

Requirement Violation	Corrective Action Taken (Y/N)	Status Open/Closed
35.315 biopsy of radiopharmaceuticals not performed within 72 hours	(Y)	(C)
19.12 Training of radiopharmacist on biopsy requirements	(Y)	(C)

D. Explain any previous violations not corrected or repeated (✓) N/A

Radiation license has been clean previous two inspections

2. ORGANIZATION AND SCOPE OF PROGRAM

A. Organizational Structure → See opposite page (G-1A)

+ Individuals contacted during inspection
* Individuals present at exit meeting

→ See next page (G-2A)

1. Meets license requirements [L/C] (✓) Y ( ) N
2. Multiple authorized locations of use (✓) Y ( ) N
   If yes, may use **ATTACHMENT A** as a guide for location(s) or lab(s) inspected and note lab numbers where violations are found. (See page G-3A) ( ) N/A
3. Briefly describe scope of activities, including types and quantities of use involving byproduct material, frequency of use, staff size, etc.

~50 authorized users for research working in ~250 labs. RPO staff authorized at 18 FTE, currently operating with 14 FTE [RPO, three supervisory HPs, 4 HPs, 5 NP Technicians, and one admin assistant]. RPO office primary responsibility for WRAMC license oversight, also assist Walter Reed Healthcare System and North Atlantic Regional Medical Command with audits/surveys/consulting of military hospitals + clinics in Northeastern U.S. 3-sealed source radiations.

INDIVIDUALS CONTACTED

*Col. William Johnson, PhD, Health Physics Officer

*Cpt. Arthur R. Morton, Chief, Operations Branch, HPO (RCC member)

Mr. David Burton, Chief, Radioactive Materials Control Branch, HPO (RCC member)

*Col. John R. Pierce, Deputy Commander for Clinical Services & Chair, RCC

Sgt. David Richter, NCO In Charge, HPO

Spc. Natisha Roberson, Health Physicist, HPO

Spc. John Dupuis, HP Tech, HPO

Spc. Keisha Kemper, HP Tech, HPO

*Tanya Gruffey, Radiation Safety Officer, WRAIR (RCC member)

Rod Suter, Radiation Safety Officer, AFIP (RCC member)

Cpt John Thomas, Radiopharmacist (RCC Member)

Col. Mary Vaeth, Chief, Preventive Medicine (RCC member)

Beau Munick, Chief Safety Officer, WRAIR

Col. John Hess, Researcher

Major Nelson Michael, researcher

*Cpt. McColl, Radiopharmacist

*Lt. Col. Massey, Chief, Nuclear Medicine

*Col. Wilcox, Commander, AFIP

*Col. Jarboe, Deputy Commander, WRAIR

Mr. David West, Medical Maintenance (by phone)

Matthew Seguine, PhD., Researcher

Claudia Desser-Anthony, Researcher

Spc. Fuller, Nuclear Medicine Technologist

Myung Choi, PhD, Medical Physicist, Radiation Oncology

Major Joseph, RN, Radiation Oncology Floor

+ Numerous Researchers & Clinical personnel

* Attended exit meeting

B. Licensee does limited distribution of pharmaceuticals[1] under Part 35 license ( ) Y (✓) N

1. Indicate type of operation:

___a. Registered or licensed with FDA as a drug manufacturer
___b. Registered or licensed with State Agency as a drug manufacturer
___c. Licensed as a pharmacy by State Board of Pharmacy
___d. Operating as a nuclear pharmacy within a Federal medical institution

2. Licensee distributes
* sealed sources ( ) Y ( ) N
* alpha and beta emitters ( ) Y ( ) N
* generators ( ) Y ( ) N
* photon emitters ( ) Y ( ) N

Remarks:

WRANC operates a radiopharmacy but no distribution — essentially a big hot lab operation. May get involved with part isotope ^{18}F-FDG from NIH in future.

C. Research involving human subjects Yes ( ) N/A

1. Research is conducted, funded, supported, or regulated by another Federal Agency which has implemented Federal Policy for Protection of Human Subjects[2]? [35.6] (✓) Y ( ) N

If no, does licensee have license amendment authorizing human research? [35.6] (✓) Y ( ) N

2. Licensee obtains informed consent from human subjects? [35.6] (✓) Y ( ) N

3. Licensee obtains approval of research activities from an Institutional Review Board? [35.6] 21 Approved protocols (✓) Y ( ) N

reviews Col. John Hess' nuclear/study injects 20 μCi Cr-51 + 20 μCi Tc-99m into patients to test effectiveness of new blood storage methods.

Remarks:

Department of Clinical Investigations Committee serves as Institutional Review Board (IRB). Research performed does not require a Radioactive Drug Research Committee (RDRC) according to FDA — Inspector checked on the new pre-approval materials for non-indicated uses.

If licensee distributes radiopharmaceuticals to several facilities, the inspector should consider the need to complete the radiopharmacy fieldnotes.

Agencies: USDA, DOE, NASA, HUD, DOJ, DOD, VA, EPA, HHS, DOT, Dept. of Commerce, Consumer Product Safety Commission, International Development Cooperation Agency, Agency for International Development, Dept. of Education, National Science Foundation

LOCATIONS of Use

ON post * Bldg 2 (Medical Center) — 100, 200, 300, 400 + research (+ blood irradiation)

* Bldg 40 (WRAIR) — research + (2) irradiators

* Bldg 41 (Health Physics Office) — operations support

* Bldg. 54 (AFIP) — research

Fort Meade — Army Drug Testing Lab — use I-125 RIA kits

— WRAIR Animal Holding Facility (burned down in 1976)

Forest Glen — Bldg. 500 — research operations in one wing

* Bldg. 516 — WRAIR holding facility

Rockville * Taft Bldg > WRAIR research

* Gillette Bldg

* facilities inspected

D. Radiation Safety Committee [33.13, 14, 15] ACTIVE ( ) N/A

Known as Radiation Control Committee

1. Membership as specified [35.22(a)(1)] (✓) Y ( ) N
2. Meetings held quarterly [35.22(a)(2)] (✓) Y ( ) N
3. Quorums established [35.22(a)(3)] (✓) Y ( ) N
4. Has sufficient authority [35.23] (✓) Y ( ) N
5. Record of Committee meetings [35.22(a)(4)] (✓) Y ( ) N
6. Approve/disapprove credentials of individuals prior to allowing them to work as an authorized user or authorized nuclear pharmacist [35.22(b)(2)(ii)] (✓) Y ( ) N
7. Approve/disapprove applications for use [L/C] (✓) Y ( ) N

Remarks: Reviewed minutes from meetings held 2/27/97, 6/12/97, 9/22/97, and 12/11/97.

E. Radiation Safety Officer

1. Appointed & on license [33.13, 35.21(a), L/C] (✓) Y ( ) N
2. Fulfills duties per [35.21(b)] (✓) Y ( ) N
3. Has sufficient authority per [35.23] (✓) Y ( ) N

F. Radiation Safety Program

Reviewed '97 annual program review

1. Minor changes pursuant to [35.31] ( ) N/A (✓) Y ( ) N
2. Records of changes maintained [35.31(b)] (✓) Y ( ) N
3. Content and implementation reviewed annually by the licensee [20.1101(c), 35.22(b)(6)] (✓) Y ( ) N
4. Records of reviews maintained [20.2102] (✓) Y ( ) N

G. Use by authorized individuals [L/C] (✓) Y ( ) N
If no, list name/position of individual

H. Mobile Nuclear Medicine Service (✓) N/A

1. Licensee operates services per [35.29, 80] ( ) Y ( ) N
2. Compliance with 20.1301 evaluated and met ( ) Y ( ) N

I. Any Amendments or Notifications since last inspection [35.13, 14] (✓) Y ( ) N

Licensee has notified NRC within 30 days after RSO stops work or changes name, or mailing address changes [35.14(b)] ( ) N/A (✓) Y ( ) N

Remarks:

3. TRAINING, RETRAINING, AND INSTRUCTIONS TO WORKERS

A. Instructions to workers/students per [10 CFR 19.12] (✓) Y ( ) N
B. Individual's understanding of current procedures and regulations is adequate (✓) Y ( ) N
C. Training program required [L/C] (✓) Y ( ) N

1. If so, briefly describe training program:

Initial Training by Authorized User and Initial formal Training by HPO Staff at first opportunity (Course offered quarterly). Annual retraining

2. Training program implemented (✓) Y ( ) N
3. Periodic training program required (✓) Y ( ) N
4. Periodic training program implemented (✓) Y ( ) N
5. Records maintained ~~( ) Y ( ) N~~ NI

Remarks:

D. Supervision of individuals

1. Supervised individuals[3] are instructed in preparation of material, principles and procedures for radiation safety and QM Program as appropriate [35.25(a)(1), 35.25(b)(1)] (✓) Y ( ) N

Research AU appears to take responsibility seriously.

2. Licensee periodically reviews supervised individuals use of material and records kept to reflect use [35.25(a)(3)] (✓) Y ( ) N

3. Authorized nuclear pharmacist or user periodically review work and records of work of supervised individuals as it pertains to preparing byproduct material [35.25(b)(3)] ( ) N/A (✓) Y ( ) N

Remarks:

Nuclear physicist review each Nuclear study prior to dose admin.

E. Therapy training

1. Safety instruction [35.310, 410, L/C]

PIS + forceps in room

a. Control of patient and visitors (✓) Y ( ) N
b. Contamination and waste (✓) Y ( ) N
c. Size/appearance of sources ( ) N/A (✓) Y ( ) N
d. Handling/shielding of sources ( ) N/A (✓) Y ( ) N
e. RSO notification in emergency or death (✓) Y ( ) N
f. Records maintained [35.310(b), 410(b)] (✓) Y ( ) N

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[3] Applies to individuals that receive, possess, use, transfer, or prepare byproduct material for medical use under supervision of authorized nuclear pharmacist or user.

Security + Control : RAM

Except for Building 40 (WKAR) and the Medical Center other Buildings require Key Card entry or require that you pass a military security guard. Inspectors found these mechanisms to be effective with the licensee taking no credit for perimeter security. Real potential for security problem is in Bldg. 40 because of ancient design + # of labs. Licensee will move out of Bldg. 40 this year. Inspectors found labs to be locked, or RAM locked, and/or attended — very minor quantities of RAM generally in use. Licensee performs 500 inventories each quarter (250 labs total), they occasionally identify unsecured RAM but always minor quantity and never repeats from previous quarters. Licensee takes enforcement action when they perceive a problem.

2. Manufacturer's instructions available and followed [35.59(a), 400] (✓) Y ( ) N
3. Training for operating and emergency procedures for HDR Remote Afterloaders (✓) N/A ( ) Y ( ) N

F. Revised Part 20

Workers cognizant of requirements for:

1. Radiation Safety Program [20.1101] (✓) Y ( ) N
2. Annual dose limits [20.1301, 1302] (✓) Y ( ) N
3. New forms 4 and 5 ( ) N/A (✓) Y ( ) N
4. 10% monitoring threshold [20.1502] (✓) Y ( ) N
5. Dose limits to embryo/fetus and declared pregnant worker [20.1208] ( ) N/A (✓) Y ( ) N
6. Grave Danger Posting [20.1902] (✓) N/A ( ) Y ( ) N
7. Procedures for opening packages [20.1906] ( ) N/A (✓) Y ( ) N
8. Sewer disposal limits [20.2003] ( ) N/A (✓) Y ( ) N

NOTE: Deficiencies in Section 3.F, while not always a violation, should be brought to the attention of licensee management at the exit meeting and in the cover letter transmitting the inspection report or NOV.

Remarks:

4. FACILITIES

A. Facilities as described in license application (✓) Y ( ) N
B. Storage areas

~250 lbs total, checked security in about 1/3 of them, found one lab with microcurie quantities of H-3 unsecured.

1. Materials secured from unauthorized removal or access [20.1801] (✓) Y ( ) N
2. Licensee controls and maintains constant surveillance of licensed material not in storage [20.1802] (✓) Y ( ) N
3. Licensee uses process or other engineering controls for airborne concentrations, internal exposures in restricted areas, and volatiles/gases in storage [20.1701, 1702, 35.90] ~~XENON use~~ (✓) Y ( ) N — I-131 capsules only
4. Maintenance program implemented for engineering controls (negative pressure, ventilation rates, filter changes, etc.) [35.205(e), L/C] (✓) Y ( ) N

C. Describe any Self-contained dry-source-storage irradiators [Part 36] and/or survey instrument calibrators (model, radionuclide, activity, use, etc) (See page G-6A)) ( ) N/A

1. Maintenance of safety-related components performed by authorized persons [L/C] (✓) Y ( ) N
2. Access to keys and/or material controlled [20.1801, 1802, L/C] (✓) Y ( ) N
3. Access to high/very high radiation areas controlled [20.1601, 1602, L/C] ~~( ) Y ( ) N~~ (N/A)
4. Adequate protection of shield integrity, fire protection [L/C] (✓) Y ( ) N

IRRADIATORS

AECL GAMMACELL 220 – currently holds 219.7 Ci Cobalt-60

AECL GAMMACELL 40 – currently holds 2014 Ci Cesium-137

AECL Gammacell blue 2 irradiator – currently holds 1825 Ci Cs-137

Gammacell 40 + 220 have been maintained by specialists in Medical Maintenance Branch. We follows recommended P&M + procedures established by AECL as described in the irradiator manuals. The involved system lubrication mostly but he has has to replace drive belts and replace/fix microswitches. Gammacell 220 sources are stationary with sample to be irradiator lowered into position in shield — source itself is never exposed. Gammacell 40 does have an irradiation chamber and shutter door where the sources move into irradiation position. A review of the unit indicates that sources cannot be exposed with door open because source rod has to pass through hole drilled in door hinge — can only happen when door is physically closed. LC 14 stated "The licensee shall not perform repairs or alterations of the irradiator involving removal of shielding or access to the licensed material." The maintenance and repairs performed are within the scope allowed by the manufacturer + the licence.

Remarks:

5. EQUIPMENT CRC 35R AND 30BC

A. Dose calibrator - Photon-emitting radionuclides

✓ 30 present each day in Nuc Med Also of NMT students, most NMT staff ~20 each day.

1. Possessed and used [35.50(a)] (✓) Y ( ) N
2. Constancy [35.50(b)(1)]
   a. Performed daily prior to use (✓) Y ( ) N
   b. Dedicated check source used (✓) Y ( ) N
3. Accuracy [35.50(b)(2)]
   a. Performed at installation and annually (✓) Y ( ) N
   b. At least 2 sealed sources used (✓) Y ( ) N
4. Linearity [35.50(b)(3)]
   a. Performed at installation and quarterly thereafter (✓) Y ( ) N
   b. Includes range between 30 uCi and the highest dosage administered (✓) Y ( ) N

~7 x end each week

Mostly cardiac + bone studies

5. Geometric Dependence [35.50(b)(4)]
   a. Performed at installation or relocation (✓) Y ( ) N
   b. Includes range of volumes and volume configurations used (✓) Y ( ) N
6. Dosage readings over 10 uCi mathematically corrected for geometry or linearity errors greater than + or - 10% (✓) N/A ( ) Y ( ) N
7. Repaired or replaced when constancy or accuracy errors exceeded + or - 10% (✓) N/A ( ) Y ( ) N
8. Approved procedures followed [35.22, 25, L/C] (✓) Y ( ) N
9. Records maintained and include identity of the individual performing the test. [35.50(e)(2)] (✓) Y ( ) N

Remarks:

B. Instrumentation - ~~Alpha or~~ beta-emitting radionuclides ( ) N/A

1. List type of equipment used to assay ~~alpha and~~ beta particles:

Same as above

2. Licensee has procedures for use of instrumentation [35.52(b)] (✓) Y ( ) N

3. Accuracy, linearity and geometric dependence tests are performed prior to initial use, periodically, and following repair, if applicable[4] [35.52(b)(1), L/C] (✓) Y ( ) N

4. Instruments are checked for constancy and proper operation at the beginning of each day of use [35.52(b)(2), L/C] (✓) Y ( ) N

5. Appropriate action taken when calibration errors in excess of limits are identified [L/C] (NA) ~~( ) Y ( ) N~~

6. Records maintained [L/C] (✓) Y ( ) N

Remarks:

C. Licensee uses generators (✓) Y ( ) N

1. Each eluate/extract used for radiopharmaceuticals tested for Mo-99 breakthrough (✓) Y ( ) N
2. No radiopharmaceuticals <u>administered</u> with Mo-99 concentrations over 0.15 uCi per mCi of Tc-99m (✓) Y ( ) N
3. Records maintained [35.204(c)] (✓) Y ( ) N

D. Syringes properly labeled and shielded [35.60] (✓) Y ( ) N
E. Vials kept in a shield [35.61(a)] (✓) Y ( ) N
F. Vial shields labeled [35.61(b)] (✓) Y ( ) N

Remarks:

6. <u>MATERIALS</u>

A. Licensee measures activity of each dosage of photon-emitting radionuclide prior to use [35.53(a)] (✓) Y ( ) N

B. Licensee administers ~~alpha or~~ beta-emitting radionuclides (✓) Y ( ) N
If yes,
1. Licensee receives unit doses and relies on assay data supplied by manufacturer or properly licensed organization [35.53(b)] (✓) Y ( ) N

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[4] Linearity and geometric dependence tests are not applicable if liquid scintillation is used. Linearity is not applicable if sodium iodide is used.

2. Licensee measures by direct measurements or combination of measurement and calculation each dosage of alpha or beta-emitting radionuclide prior to medical use [35.53(b)] (both) (✓) Y ( ) N

C. Unsealed material used under 35.100.200.or 300 are [35.100(b). 35.200(b). 35.300(b):
(1) Obtained from manufacturer or properly licensed organization AND/OR (✓) Y ( ) N
(2) Prepared by authorized nuclear pharmacist or physician user or individual under the supervision of a authorized nuclear pharmacist or physician user (✓) Y ( ) N

D. Isotope. chemical form. quantity and use as authorized [31.11. 35.400.500. L/C] (✓) Y ( ) N

Remarks:

E. Use of RAM [L/C]

1. Protective clothing worn (✓) Y ( ) N
2. Personnel routinely monitor their hands (✓) Y ( ) N
3. No eating/drinking in use/storage areas (✓) Y ( ) N
4. No food. drink. or personal effects kept in use/storage areas (✓) Y ( ) N
5. Proper dosimetry worn (✓) Y ( ) N
6. Radwaste disposed in proper receptacles (✓) Y ( ) N
7. No pipetting by mouth (✓) Y ( ) N

F. Radioisotopes are used in research in accordance with current procedures [L/C] (✓) Y ( ) N

G. Leak tests and Inventories

See ATTACHED Inventory performed 1/22/98

1. Leak test performed on sealed sources and brachytherapy sources [35.59(b)] (✓) Y ( ) N
2. Leak test records in microcuries (✓) Y ( ) N
3. Inventory of sealed sources and brachytherapy sources performed quarterly [35.59(g)] (✓) Y ( ) N
4. Inventory performed promptly at the storage area after removing sources from a patient to ensure all sources taken from the storage area are returned [35.406(a)] (✓) Y ( ) N
5. Records maintained and signed by RSO [35.59. 406] (✓) Y ( ) N

Remarks:

LICENSE LIMITS 150 Ci SS CESIUM, 1 Ci SS I-129, AND 500 mCi SS Cobalt Cs SOURCE IS AN OLD CALIBRATOR WHICH IS STORED IN BLDG 516; I-129 AND μCi SIZE CALIBRATOR/INSTRUMENT CHECK SOURCES; COBALT 60 AND IN SMALL CHECK SOURCES HELD IN NUCMED.

7. RADIATION SURVEYS ( ) N/A

A. Survey instruments

1. Appropriate operable survey instrumentation possessed [35.120, 220, 320, 420, L/C] or available [35.520, L/C] ( ) N/A (✓) Y ( ) N
2. Calibrations [35.51(a), (b)]

a. Before first use, annually & after repairs (✓) Y ( ) N
b. Approved calibration procedure followed to include check source reading determination [35.51(a)(3), L/C] (✓) Y ( ) N
c. Within 20% in each scale or decade of interest [L/C] (✓) Y ( ) N

3. Records maintained [35.51(d)] (✓) Y ( ) N
4. Source-checked each day of use [35.51(c)] (✓) Y ( ) N

B. Radiation surveys performed

1. Daily in all areas where radiopharmaceuticals are prepared or administered [35.70(a)] (✓) Y ( ) N
2. Weekly in all areas where radiopharmaceuticals or waste is stored [35.70(b)] (✓) Y ( ) N
3. Weekly wipes in all areas where radiopharmaceuticals are prepared for use, administered or stored [35.70(e)] (✓) Y ( ) N
4. Quarterly in brachytherapy source storage area (✓) Y ( ) N

C. Trigger levels [35.70(d), (g)]

1. Established (✓) Y ( ) N
2. Exceeded (✓) Y ( ) N
3. Corrective action taken and documented (✓) Y ( ) N

D. Techniques can detect 0.1 mR/hr, 2000dpm [35.70] (✓) Y ( ) N
E. Records maintained [35.70(h), L/C] (✓) Y ( ) N
F. Protection of members of the public

Note: See IN 94-09 for updated guidance on conflicts between Parts 20 and 35.

1. Licensee made adequate surveys to demonstrate either (1) that the TEDE to the individual likely to receive the highest dose does not exceed 100 mrem in a year, or (2) that if an individual were continuously present in an unrestricted area, the external dose would not exceed 2 mrem in any hour and 50 mrem in a year [20.1301(a)(1), 1302(b)] (✓) Y ( ) N
2. Unrestricted area radiation levels do not exceed 2 mrem in any one hour [20.1301(a)(2)] (✓) Y ( ) N
3. Records maintained [20.2103, 2107] (✓) Y ( ) N

Radiopharmaceutical Tx

19 Inpatient ablations in '97.
4 ^{153}Sm in '97
5 ^{89}Sr in '97
98 I-131 outpatient Tx in '97
52 I-131 diagnostic procedures in '97 (5 mCi used for head/neck/chest scan)

KNS Issues
Dosimetry

Licensee performs all required surveys in patient room and in adjacent areas, including areas above + below Tx patient's room.

Release patient "conditionally" if < 5 mR/hr @ 1 meter and < 33 mCi
Release patient "unconditionally" if < 7 mCi retained.

Licensee measures exposure rate at door with patient staying 1 meter from "safe line" (about 2 meters from door) so record indicates dose rate in excess of 2 mR/hr at the door – actual dose rate with patient in bed or in chair much less than 2 mR/hr @ door.

G. Describe licensee's survey requirements for research areas( ) N/A

each user + HPO perform weekly/ monthly / or quarterly survey

H. Research areas surveyed as required [20.1501(a), L/C] (✓) Y ( ) N
I. Research area survey records maintained [20.2103, L/C](✓) Y ( ) N

Remarks:

8. Patient Release ( ) N/A

THE FOLLOWING GUIDANCE IS TO BE USED AFTER THE 1997 REVISION TO 10 CFR 35.75 BECOMES EFFECTIVE. IF USING THIS SECTION, DO NOT ANSWER ITEMS 9.C AND 10.C BELOW.

A. Individuals released when TEDE less than 0.5 mrem [35.75(a)] (✓) Y ( ) N
B. Instructions on ALARA provided to individual when TEDE exceeds 0.1 rem [35.75(b)] (✓) Y ( ) N
C. Instructions to breast-feeding women included required information [35.75(b)] (✓) Y ( ) N
D. Release records mainatined if 35.75(c) criteria are not met [35.75(c)] (✓) Y ( ) N
E. Records of instructions given to breast-feeding women maintained if required [35.75(d)] (✓) Y ( ) N

9. RADIOPHARMACEUTICAL THERAPY ( ) N/A

A. Safety precautions implemented to include patient facilities, posting, stay times, patient safety guidance, release and contamination controls [35.315(a), L/C] (✓) Y ( ) N
B. Area dose rate surveys and room contamination surveys [35.315(a)(4), (7)] (✓) Y ( ) N
C. Release of patients containing radiopharmaceuticals meets <5 mR/hr @ 1m or <30 mCi [35.75] (✓) Y ( ) N
D. RSO promptly notified if patient died or had a medical emergency [35.315(b)] (✓) N/A ( ) Y ( ) N

Remarks: Licensee permitted to decay room to 2000dpm IAW letters dated 4/8/92 + 11/24/92 prior to admitting a second Iodine Tx patient. Room dedicated for Iodine Tx — Key controlled by RSO staff — door locked when not in use.

10. BRACHYTHERAPY ( ) N/A

A. Safety precautions implemented to include patient facilities, room posting, stay times, and area radiation level surveys [35.415, L/C] (✓) Y ( ) N
B. Patients surveyed immediately after implant [35.406] (✓) Y ( ) N
C. Release of patients with permanent implants meets <5 mR/hr @ 1m [35.75] ( ) N/A (✓) Y ( ) N

Brachytherapy | RNS swr discovery |

32 Tx IN '97. Use cesium, iridium, iodine-125, AND palladium. Increasing use of permanent implants for prostate Tx, mainly with Pd-103.

Temporary implants require ambient exposure rates in adjacent areas, including above + below. Lock neighboring rooms wherever possible even if < 2mR/hr. Track patients to ensure received < 100 mRem in one year

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See Attached document which references 6/9/97 event when licensee was shipped a reported 120 Iodine-125 seeds and only 119 were found in shipment by licensee. Licensee reported to Region I on 6/11 and to Ops Center on 6/12/97. Licensee submitted 10 CFR 20 report on 6/12/97 stating that they believed only 119 seeds were shipped — No real loss of Rem. Docket file contained no record of the event in the licensee 6/12/97 report. Event report was found by Inspector on 2/17/98. Licensee provided a copy of their 6/12/97 notification.

Inspector reviewed event + licensee's methods for receiving + inventorying Iodine-125 seeds and concluded that it is probable that only 119 seeds were shipped.

6-11A

D. Patients surveyed immediately after removing the last temporary implant source (required for all manual, LDR, MDR, and HDR therapies) [35.404(a)] ( ) N/A (✓) Y ( ) N

E. Records maintained [35.404(b), 406(d), 415(a)(4)] (✓) Y ( ) N

Remarks: gen 2 – well developed QMP – requires 2ND person observe source loading. Sr-90 eye applicators not used – one has been calibrated recently – 3 in storage in Rad Oncology, one in storage w/ vendor facility.

11. RADIOACTIVE WASTE ( ) N/A

A. Disposal <65 Days + I-125, Co-58, Ir-192, AND Sc-46

DU waste is not segregated substantially. Everything less than 60 days is held 20 months, remainder held 30 months (I-125, Sc-46, Co-58, Ir-192).

1. Decay-in-storage ( ) N/A

a. Approved [20.2001, 35.92, L/C] (✓) Y ( ) N
b. Procedures followed [35.92, L/C] (✓) Y ( ) N
c. Labels removed or defaced [20.1904, 35.92] (✓) Y ( ) N

2. Special procedures performed as required [L/C] (✓) Y ( ) N
3. Liquid scintillation (LS) media and animal carcasses per [20.2005] ( ) N/A (✓) Y ( ) N
4. Improper/unauthorized disposals [20.2001] ( ) Y (✓) N none
5. Records maintained [20.2103(a), 2108, L/C] (✓) Y ( ) N

B. Effluents ( ) N/A

1. Release into sanitary sewer [20.2003] ( ) N/A (✓) Y ( ) N

a. Material is readily soluble or readily dispersible [20.2003(a)(1)] (✓) Y ( ) N
b. Monthly average release concentrations do not exceed App B, Table 2 values (✓) Y ( ) N
c. No more than 5 Ci of H-3, 1 Ci of C-14 and 1 Ci of all other radionuclides combined released in a year [20.2003(a)] (✓) Y ( ) N
d. Procedures to ensure representative sampling and analysis implemented [20.1501, L/C] (✓) Y ( ) N

All non-rad waste in research areas surveyed prior to disposal with handheld meters.

259.7 mCi H-3
3.08 mCi C-14
36.9 mCi other

2. Release into septic tank [20.2003] (✓) N/A ( ) Y ( ) N

a. Within unrestricted limits [App B, Table 2] ( ) Y ( ) N N/A

3. Waste incinerated (✓) N/A

a. License authorizes [20.2004(a)(3)] ( ) Y ( ) N
b. Licensee directly monitors exhaust ( ) Y ( ) N N/A
c. Airborne releases evaluated and controlled [20.1501, 1701] ( ) Y ( ) N

Remarks:

THE LICENSEE SAMPLE FOR AIRBORNE IODINE-, IN THE NUCLEAR MEDICINE HOT LAB AND INSIDE THE HOOD. BECAUSE THE CHARCOAL FILTER INSIDE OF THE HOOD WAS EXHAUSTED, RESULTS OF BREATHING ZONE SAMPLING AND HOOD SAMPLING WERE SIMILAR FROM MONTH TO MONTH, AVERAGING ABOUT 1E-10 μCi/ml. THE LICENSEE ATTRIBUTED THE RELATIVELY HIGH CONCENTRATION TO VENTING OF IODINE-131 DOSES IN HOOD OR IN FRONT OF HOOD NEAR THE DOSE CALIBRATOR. THE DAC FOR I-131 IS 2 E-8 μCi/ml, A FACTOR OF ABOUT 200 TIMES MORE THAN WHAT IS INDICATED BY THE SAMPLING. THE AIR EFFLUENT LIMIT IS 2E-10 μCi/ml. WHILE THE MEASURED CONCENTRATION IS ONLY HALF OF THE LIMIT, ALSO CONSIDER THAT THE MEASUREMENT WAS MADE IN THE HOOD AND DOES NOT INCLUDE DILUTION IN AIR AS EXHAUST OCCURS ABOVE ROOF OF AN 8 STORY BUILDING + ROOF IS RESTRICTED AREA. "COMPLY" MEANS INDOSE THAT LICENSEE IS IN COMPLIANCE AT LEVEL I, LICENSEE RECENTLY REPLENISHED THE ACTIVATED CHARCOAL IN THE HOOD FILTER AND EXPECTS THE EFFLUENT NUMBERS TO DROP TO NEAR ZERO. THE LICENSEE HAS ALSO REINFORCED THE NEED (FOR ALARA PURPOSES) TO VENT IODINE DOSES WITHIN THE HOOD.

ROUTINE THYROID BIOASSAYS DO NOT INDICATE UPTAKE BY RADIOPHARMACISTS. SEE THE LICENSEE'S PLOT FOR BZ AND EFFLUENT SAMPLING IN NUCMED FOR 1997 WHICH IS ATTACHED TO THIS REPORT.

4. Control of air effluents and ashes [20.1101, 1201, 1301, 1501, 2001, L/C]
{See also IP 87102, RG 8.37} ( ) N/A

a. Air effluent less than 10 mrem constraint limit [20.1101] (✓) Y ( ) N

b. If no, licensee reported appropriate information to NRC ( ) Y (✓) N (NA)
1. Corrective actions implemented and on schedule ( ) Y (✓) N

c. Description of effluent program

1. Monitoring system hardware adequate (✓) Y ( ) N
2. Equipment calibrated as appropriate (✓) Y ( ) N
3. Air samples/sampling technique (i.e. charcoal, HEPA, etc.) analyzed with appropriate instrumentation (✓) Y ( ) N

Remarks: XENON used. ONLY AIR SAMPLES pulled from UNIT IN OUTAGE. NO other use WARRANTS evaluation.

C. Waste Management ( ) N/A

1. Waste compacted (✓) Y ( ) N
2. Storage area(s) ( ) N/A

a. Protection from elements and fire [L/C] (✓) Y ( ) N
b. Control of waste maintained [20.1801] (✓) Y ( ) N
c. Containers properly labeled and area properly posted [20.1902, 1904] (✓) Y ( ) N
d. Package integrity maintained [L/C] (✓) Y ( ) N

3. Packaging, Control and Tracking [App. F.III] [20.2006(d)]

Note: The licensee's waste is likely to be Class A.

a. Not packaged for disposal in cardboard or fiberboard boxes [61.56(a)] ( ) Y ( ) N
b. Liquid wastes solidified, i.e., less than 1% freestanding liquid, and void spaces minimized [61.56(a), (b)] ( ) Y ( ) N (NA)

c. Does not generate harmful vapors [61.56] ( ) Y ( ) N

d. Structurally stable (will maintain its physical dimensions and form under expected disposal conditions) [61.56(b)] ( ) Y ( ) N
e. Packages properly labeled [App. F.III.A.2] ( ) Y ( ) N

f. Licensee conducts a QC program to ensure compliance with [61.55, 56] and includes management evaluation of audits [App. F.III.A.3] ( ) Y ( ) N

g. Shipments not acknowledged within 20 days after transfer are investigated and reported [App. F.III.A.8] ( ) N/A ( ) Y ( ) N

4. Transfers to land disposal facilities ( ) N/A

a. Transferred to person specifically licensed to receive waste [30.41, 20.2001(b)] ( ) Y ( ) N

b. Each shipment accompanied by a manifest prepared as specified in Section I of Appendix F [20.2006(b) and App. F.III.A.4] ( ) Y ( ) N

c. Manifests certified as specified in Section II of Appendix F [20.2006(c)] ( ) Y ( ) N

D. Records of surveys and material accountability are maintained [20.2103, 2108] ( ) Y ( ) N

Remarks: LLRW shipped to DOD waste consolidation facility in Barnwell, SC prior to disposal

12. RECEIPT AND TRANSFER OF RADIOACTIVE MATERIAL

A. Describe how packages are received and by whom [33.13, L/C] All received from delivery to NFO office, other to Nuc Med pharmacy ( ) N/A

B. Written package opening procedures established and followed [20.1906(e)] (✓) Y ( ) N

C. All incoming packages with a DOT label wiped, unless exempted (gases and special form) [20.1906(b)(1)] (✓) Y ( ) N

D. Incoming packages surveyed [20.1906(b)(2), L/C] (✓) Y ( ) N

E. Monitoring in (C) and (D) above performed within time specified [20.1906(c)] (✓) Y ( ) N

F. Transfer(s) between licensees performed per [30.41] (✓) Y ( ) N

G. All sources surveyed before shipment and transfer [20.1501(a), 49 CFR 173.475(i), L/C] (✓) Y ( ) N

H. Records of surveys and receipt/transfer maintained [20.2103(a), 30.51] (✓) Y ( ) N

I. Transfers within licensee's authorized users or locations performed as required [L/C] ( ) N/A (✓) Y ( ) N

J. Arrangements made for packages containing quantities of radioactive material in excess of Type A quantity [20.1906(a)] (✓) Y ( ) N

K. Package receipt/distribution activities evaluated for compliance with 20.1301 [20.1302] (✓) Y ( ) N

Remarks:

13. TRANSPORTATION (10 CFR 71.5(a) and 49 CFR 171-189) ( ) N/A

A. Licensee shipments are:

(✓) delivered to common carriers
( ) transported in licensee's own private vehicle
( ) both
( ) no shipments since last inspection

B. Licensee returns radiopharmacy doses ( ) N/A ( ) Y (✓) N

1. Licensee assumes shipping responsibility ( ) Y ( ) N
2. If NO, describe arrangements made between licensee and radiopharmacy for shipping responsibilities:

C. Packages

1. Authorized packages used [173.415, 416] ( ) N/A (✓) Y ( ) N
2. Performance test records on file ( ) N/A

a. DOT-7A packages [173.415(a)] (✓) Y ( ) N
b. Special form sources [173.476(a)] ( ) Y ( ) N

3. Two labels (White-I, Yellow-II, Yellow-III) with TI, Nuclide, Activity, and Hazard Class [172.403, 173.441] (✓) Y ( ) N
4. Properly marked (Shipping Name, UN Number, Package Type, RQ, "This End Up" (liquids), Name and Address of consignee) [172.301,306,310,312,324] (✓) Y ( ) N
5. Closed and sealed during transport [173.475(f)] (✓) Y ( ) N

D. Shipping Papers ( ) N/A

1. Prepared and used [172.200(a)] (✓) Y ( ) N
2. Proper {Shipping Name, Hazard Class, UN Number, Quantity, Package Type, Nuclide, RQ, Radioactive Material, Physical and Chemical Form, Activity, Category of label, TI, Shipper's Name, Certification and Signature, Emergency Response Phone Number, "Limited Quantity" (if applicable), "Cargo Aircraft Only" (if applicable)} [172.200-204] (✓) Y ( ) N
3. Readily accessible during transport [177.817(e)] ( ) Y ( ) N (NI)

Remarks:

14. PERSONNEL RADIATION PROTECTION

A. Licensee performed exposure evaluation [20.1501] (✓) Y ( ) N
B. Licensee incorporated ALARA considerations in the Radiation Protection Program [35.20, 20.1101(b)] (✓) Y ( ) N

— GOOD INVESTIGATION when exceed ALARA levels — none due to machine source

Dosimetry

Army Investigation Levels (Formal investigation required)

	Monthly	Quarterly
DDE	400	1250
eye	1250	3750
extremity	4150	12500

NRC License ALARA Levels (Quarterly)

	ALARA I	ALARA II
DDE	125	375
eye	375	1125
extremity	1250	3750

C. External Dosimetry ( ) N/A

good return of badges, assign exposure based on indiv. work load if lost badge

1. Licensee monitors workers [20.1502(a), L/C] (✓) Y ( ) N
2. External exposures account for contributions from airborne activity [20.1203] (✓) N/A ( ) Y ( ) N
3. Supplier Radiation Alert Frequency monthly/Quarterly
4. Supplier is NVLAP-approved [20.1501(c)] (✓) Y ( ) N
5. Dosimeters exchanged at required frequency [L/C] (✓) Y ( ) N

D. Internal Dosimetry Captus 2000 thyroid uptake sys used for bioassay ( ) N/A

1. Licensee monitors workers [20.1502, L/C] (✓) Y ( ) N
2. Briefly describe licensee's program for monitoring and controlling internal exposures [20.1701, 1702, L/C]:
3. Aerosols and gases sampled [20.1204, 35.205] (✓) Y ( ) N
4. Monitoring/controlling program implemented (includes bioassays) [35.205(d), 315(a)(8), L/C] (✓) Y ( ) N
5. Respiratory protection equipment [20.1703] (✓) Y ( ) N None

Quarterly bioassay everyone in NNC NOS + within 72 hours if help prepare or assist. Tc done

E. Reports

1. Reviewed by RSO Frequency monthly
2. Inspector reviewed personnel monitoring records for period 1/97 to 12/97
3. Prior dose determined for individuals likely to receive doses [20.2104] (✓) Y ( ) N
4. Maximum exposures TEDE 600 Other 4000 ext
5. Maximum CDEs — Organ(s) —
6. Maximum CEDE —
7. Licensee sums internal and external [20.1202] (✓) Y ( ) N
8. TEDEs and TODEs within 20.1201 limits (✓) Y ( ) N
9. NRC forms or equivalent [20.2104(d), 2106(c)]

   a. NRC-4 (✓) Y ( ) N Complete: (✓) Y ( ) N
   b. NRC-5 (✓) Y ( ) N Complete: (✓) Y ( ) N

10. Worker declared her pregnancy in writing during inspection period (review records) ( ) N/A (✓) Y ( ) N
    If yes, licensee in compliance with [20.1208] (✓) Y ( ) N
    and records maintained (✓) Y ( ) N

F. Who performed any PSEs at this facility (number of people involved and doses received) [20.1206, 2104(b), 2105, 2204] (✓) N/A

G. Records of exposures, surveys, monitoring, and evaluations maintained [20.2102, 2103, 2106, 35.205(d), 315(a)(8), L/C] (✓) Y ( ) N

Remarks:

15. MISADMINISTRATIONS AND RECORDABLE EVENTS None

A. If misadministrations or recordable events (defined in 35.2) have occurred since last inspection, evaluate the incident(s) and the licensee's quality management program (QMP) using the existing guidance. [Reference TI 2800/025 and IP 87103]

1. Event date _____ Information Source _____
2. Notifications

NRC Ops Center	( ) Y ( ) N	Region	( ) Y ( ) N
Referring Physician	( ) Y ( ) N	Patient	( ) Y ( ) N
In writing	( ) Y ( ) N		

If notification did not occur, why not:

3. Written Reports [35.33]

a. Submitted to Region within 15 days ( ) Y ( ) N
b. Copy to patient within 15 days ( ) Y ( ) N

B. Records maintained [35.33(b)] ( ) Y ( ) N

Remarks:

16. NRC INDEPENDENT MEASUREMENTS

A. Survey instrument	Serial No.	Last calibration
14c / 9	33506 / 27853	9/15/97 / 9/15/97

B. Inspector's measurements were compared to licensee's (✓) Y ( ) N
C. Describe the type, location, and results of measurements:

Model 9 ion chamber used to survey research irradiators — minimum counts 0.2 mR/hr

Licensee 14c measure <0.2 mR/hr at 2 in 100 mm Tc primary mm

Various research labs, sealed source storage in Oncology, waste in bldg 51 all as expected

17. NOTIFICATION AND REPORTS

A. Licensee in compliance with [19.13] (reports to individuals, public and occupational, monitored to show compliance with Part 20) ( ) None (✓) Y ( ) N

B. Licensee in compliance with [20.2201] (theft or loss) (✓) None ( ) Y ( ) N

Licensee has a no. of Decommission activities in progress and planned:

Bldg 40 – WRAIR – 500k sq. ft bldg – all records – will be closed in 1998 – records transferred to new Forest Glen facility. Bldg. will be used for non-licensed activities – must decommission. Biggest problem is old "reactor space" in sub basement which was decommissioned in 1970's to standards in place at that time. Facility currently secured. Planning to contract out decommissioning. – No license amendment required (Notified 12/12/97

Fort Detrick Animal Holding Facility – used for one experiment in 1970's involving I-125 + I-131. Facility burned down in 1996. Performing survey now – will need to amend license. (Notified 8/5/97)

Fort Detrick Institute of Dental Research – limited use of H-3, C-14, + I-125 RIA – closed this year + relocated to Great Lakes, Mich Bldgs. 2803, 2805, + 2813 will be decommissioned – license amend will be required. (Notified 8/5/97)

Buildings 508 + 511 in Forest Glen (Notified 12/12/97) } decom beginning, no amend necessary
Building 149A + 513 in Forest Glen (no unsealed now) Notified 6/24/97 }
Bldg 188 in Forest Glen (former HP Office) — decom. completed. (Notified 12/6/96)
Bldgs 500, 502, + 512 in Forest Glen will be closed shortly – only some limited records still existing in Bldg. 500 (Notified 12/12/97)

In addition, Bldg. 516 in Forest Glen is being used for waste storage. It has an old "reactor space" in the basement. Since they are still using for licensed activities they do not have to decom. Some decom was performed when reactor was removed in 1980's.

C. Licensee in compliance with [20.2202] (incidents) See page G-11A ( ) None (✓) Y ( ) N

D. Licensee in compliance with [20.2203] (overexposures and high radiation levels) (✓) None ( ) Y ( ) N

E. Licensee aware of NRC Ops Center phone number (✓) Y ( ) N

F. Licensee in compliance with [20.2203] (Constraint on air emissions) ( ) None (✓) Y ( ) N

18. POSTING AND LABELING

A. NRC-3 "Notice to Workers" is posted [19.11] (✓) Y ( ) N

B. Parts 19, 20, 21, Section 206 of Energy Reorganization Act, procedures adopted pursuant to Part 21, and license documents are posted or a notice indicating where documents can be examined is posted [19.11, 21.6] (✓) Y ( ) N

C. Other posting and labeling per [20.1902, 1904] and the licensee is not exempted by [20.1903, 1905] (✓) Y ( ) N

Remarks:

19. RECORDKEEPING FOR DECOMMISSIONING

A. Records of information important to the safe and effective decommissioning of the facility maintained in an independent and identifiable location until license termination [30.35(g)] (✓) Y ( ) N

B. Records include all information outlined in [30.35(g)] (✓) Y ( ) N

Remarks: (See page G-17A)

20. BULLETINS AND INFORMATION NOTICES

A. Bulletins, Information Notices, NMSS Newsletters, etc., received by the licensee (✓) Y ( ) N

B. Licensee took appropriate action in response to Bulletins, Generic Letters, etc. (✓) Y ( ) N

Remarks:

21. SPECIAL LICENSE CONDITIONS OR ISSUES (✓) N/A

A. Special license conditions or issues to be reviewed:

B. Evaluation:

22. DEBRIEF WITH LICENSING STAFF

Inspection findings discussed with licensing staff ( ) N/A (✓) Y ( ) N

Items discussed:

Debriefed Decon Branch of these activities.

23. CONTINUATION OF REPORT ITEMS

(NA)

24. VIOLATIONS, NCVs, AND OTHER ISSUES

Note: Briefly state (1) the requirement and (2) how and when the licensee violated the requirement. For non-cited violations, indicate why the violation was not cited.

(NA)

25. PERFORMANCE EVALUATION FACTORS

Licensee (name & location) DEPARTMENT OF THE ARMY WALTER REED ARMY MEDICAL CTR WASHINGTON, DC

Inspector Dwyer

Inspection Date 2/11-2/12/98

A.	Lack of senior management involvement with the radiation safety program and/or Radiation Safety Officer (RSO) oversight	( ) Y (✓) N
B.	RSO too busy with other assignments	( ) Y (✓) N
C.	Insufficient staffing	( ) Y (✓) N
D.	Radiation Safety Committee fails to meet or functions inadequately	( ) Y (✓) N
E.	Inadequate consulting services or inadequate audits	( ) Y (✓) N
F.	Financial Instability	( ) Y (✓) N

Remarks (consider above assessment and/or other pertinent PEFs):

Very good program

Regional follow-up on above PEFs citations:

END

Bldgs 2, 40, 41, 54, Tate Court, Gillette, + Forest Glen.

Inspection [illegible] Rockville, Forest Glen, + Washington DC

ATTACHMENT A
LABORATORY INSPECTION FIELD NOTES

1. Date 2/11-2/13/98 Authorized User(s) Numerous

2. Location(s) Building _____ Room(s) various

3. Person(s) Contacted See page G-2a

4. Describe scope of lab use (Nuclides, form, frequency, purpose, etc):

~50 Au, 250 labs, very low use of CHIPS.

5. Training
   A. Frequency: Initial/annual Conducted by: AU/HPO
   B. Individuals interviewed understand safety practices (✓) Y ( ) N

Remarks:

6. Surveys
   A. Types of surveys performed (daily, weekly, monthly, etc.)

Researchers required to survey during & after each use. RPO office surveys labs weekly, monthly, or quarterly based on level of use in lab.

   B. Instrumentation properly calibrated and used (✓) Y ( ) N
   C. Efficiency of counting system determined (✓) Y ( ) N
   D. Hood airflow adequate and checked as required ( ) N/A (✓) Y ( ) N
   E. Records maintained: trigger levels established, area diagram, instrument used, individual performing survey, results in proper units, decontamination performed as necessary, etc.) (✓) Y ( ) N
   F. Inspector surveyed (✓) Y ( ) N
      Results satisfactory ( ) N/A (✓) Y ( ) N

Annual surveys are announced

AU required to submit Quarterly Inventory of Raw in lab.

Remarks:

57% labs surveyed weekly by RPO staff; 29% labs surveyed monthly by RPO; remainder performed quarterly.

7. Receipt and Transfer
   A. Incoming packages properly surveyed (✓) Y ( ) N
   B. Interlaboratory transfers performed as specified in the license ( ) N/A (✓) Y ( ) N
   C. Records maintained (✓) Y ( ) N

Remarks: Raw purchased through departmental office - must have authorized number - all raw for records delivered to RPO's office. — Very good records for use of raw from each vial.

8. Personnel Dosimetry
   A. Appropriate dosimetry assigned and worn ( ) N/A (✓) Y ( ) N
   B. Results available to lab personnel (✓) Y ( ) N

   C. Bioassays performed ( ) N/A (✓) Y ( ) N

Remarks:

9. Handling Waste

A.	Procedures followed	(✓) Y ( ) N
B.	Proper storage (area, containers, labeling, etc.)	(✓) Y ( ) N
C.	Liquid/solid waste disposal	(✓) Y ( ) N
D.	Incineration	(✓) N/A ( ) Y ( ) N
E.	Compaction	( ) N/A (✓) Y ( ) N
F.	Sewer discharge	( ) N/A (✓) Y ( ) N
G.	Records maintained	(✓) Y ( ) N

Remarks:

10. Inventory conducted ( ) N/A (✓) Y ( ) N
Records Maintained (✓) Y ( ) N

Remarks: quarterly inventory by Recorder
semiannual inventory by HPO staff

11. Storage and use of RAM

A.	Adequate method to prevent unauthorized access	(✓) Y ( ) N
B.	Condition of areas acceptable	(✓) Y ( ) N
C.	Personnel wear disposable gloves and protective clothing while handling material	(✓) Y ( ) N
D.	Hands monitored after procedures or before leaving	(✓) Y ( ) N
E.	No eating, drinking, or smoking in use/storage areas	(✓) Y ( ) N
F.	No food, drink, or personal items stored in use/storage areas	(✓) Y ( ) N
G.	Use of shielding/distance while using/storing material	(✓) Y ( ) N
H.	RAM is under surveillance and control when not in storage in an unrestricted area	(✓) Y ( ) N

Remarks:

12. Posting and Labeling

A.	NRC-3 "Notice to Workers"	(✓) Y ( ) N
B.	Parts 19, 20, 21, Section 206 of Energy Reorganization Act, procedures for Part 21, and license documents or a notice indicating where documents can be examined	(✓) Y ( ) N
C.	Other posting and labeling requirements met	(✓) Y ( ) N

Remarks:

13. Violations Observed

None

END

Printed on 7/14/10

HOSPITAL

EVENT NUMBER: 32542

LICENSEE: WALTER REED ARMY MEDICAL CENTER
CITY: WASHINGTON DC REGION: 1
COUNTY: STATE: DC
LICENSE#: 08-01738-02 AGREEMENT: N
DOCKET:

NOTIFICATION DATE: 06/26/97
NOTIFICATION TIME: 09:00 [ET]
EVENT DATE: 06/10/97
EVENT TIME: 12:00[EDT]
LAST UPDATE DATE: 06/26/97

NOTIFICATIONS

FRANK COSTELLO	RDO
DON COOL, NMSS	EO

NRC NOTIFIED BY: COL. JOHNSON
HQ OPS OFFICER: JOHN MacKINNON

EMERGENCY CLASS: NOT APPLICABLE
10 CFR SECTION:
BAB2 20.2201(a)(1)(ii) LOST/STOLEN LNM>10X

EVENT TEXT

MISSING IODINE-125 (0.5 mCi) SEED

ON 06/09/97 WALTER REED ARMY MEDICAL CENTER RECEIVED A PACKAGE SENT FROM AMERSHAM (LOCATED IN IL) SUPPOSEDLY CONTAINING 120 IODINE-125 SEEDS (0.5 mCi PER SEED). THE IODINE-125 SEEDS (0.7mm DIA AND 4.5mm IN LENGTH) ARE SEALED SOURCES USED IN BRACHYTHERAPY FOR THE TREATMENT OF PROSTRATE CANCER. ON RECEIPT THE PACKAGE WAS SURVEYED AND THE SURVEY LEVELS WERE WITHIN THE SPECIFIED LIMITS. ON 06/10/97 THE PACKAGE CONTAINING THE IODINE-125 SEEDS WAS TAKEN TO THE ONCOLOGY LAB WHERE THE SEALS TO THE PACKAGE WERE BROKEN OPEN AND A COUNT OF THE IODINE-125 SEEDS WAS PERFORMED. THE LICENSEE COUNTED ONLY 119 IODINE-125 SEEDS. A SURVEY OF THE AREA WHERE THE PACKAGE WAS OPENED WAS PERFORMED USING A GEIGER-MUELLER DETECTOR AND THE MISSING SEED WAS NOT FOUND. WALTER REED ARMY MEDICAL CENTER CONTACTED AMERSHAM ON 06/10/97 AND INFORMED THEM THAT THEY HAD ONLY COUNTED 119 IODINE-125 SEEDS AND THE SHIPPING MANIFEST FOR THE PACKAGE INDICATED THAT THE PACKAGE CONTAINED 120 IODINE-125 SEEDS. ON 06/17/976 AMERSHAM NOTIFIED WALTER REED ARMY MEDICAL AND SAID THAT THEY HAD SENT 120 IODINE-125 SEEDS TO WALTER REED ARMY MEDICAL CENTER. WALTER REED ARMY MEDICAL CENTER BELIEVES THAT THEY ONLY RECEIVED 119 IODINE-125 SEEDS. ON 06/11/97 WALTER REED ARMY MEDICAL CENTER NOTIFIED NRC REGION 1 (NEELAM BHALLA) OF THIS EVENT.

THE LICENSEE WILL SUBMIT A 30 DAY WRITTEN REPORT TO THE NRC REGION 1 OFFICE DETAILING THE ABOVE EVENT.

DEPARTMENT OF THE ARM.
WALTER REED ARMY MEDICAL CENTER
WASHINGTON, DC 20307-5001

REPLY TO
ATTENTION OF:

June 26, 1997

Preventive Medicine Services

SUBJECT: Inventory Discrepancy of I-125 Brachytherapy Seed, NRC Incident Number 32542

Nuclear Regulatory Commission, Region I
Medical Licensing Division
475 Alendale Road
King of Prussia, Pennsylvania 19406-1415

Medical Licensing Division:

Walter Reed Army Medical Center (WRAMC), Washington, DC, uses byproduct material authorized by U.S. Nuclear Regulatory Commission (NRC) license number 08-01738-02 with an expiration date of June 30, 2004. This is a medical broadscope Type A license for human use and research.

As per Subpart M -- Reports of 10 CFR 20.2201, a written report must be filed within 30 days of notification of the NRC Operations Center. The NRC Operations Center was notified on June 26, 1997, (Mr. John MacKinnon) regarding this incident. An account of the incident was taken and an incident reference number (32,542) was provided.

Description of the Licensed Material. The missing radioactive material is one I-125 sealed source brachytherapy seed that is cylindrically shaped, 0.8 mm in diameter by 4.5 mm long with an apparent activity outside the seed of 0.31 mCi and an internal source activity of 0.5 mCi per seed.

Description of Circumstances. We received a shipment of I-125 sealed source brachytherapy seeds on June 9, 1997. The package was surveyed by the Health Physics Office and hand carried to Radiation Oncology Services. The shipment manifest indicated that 120 seeds were sent. On the morning of June 10, 1997, Mr. Eck, an Electronics Technician, and Dr. Choi, a Medical Physicist, opened the package and broke the seal on the lead pig in the Radiation Oncology radioactive source room inside a lead shielded cave in order to inventory the seeds. Once the first inventory was completed, only 119 seeds were counted. The Health Physics Office was immediately notified of the discrepancy between the amount ordered and the number of seeds counted. Mr. Burton, a Health Physicist, responded to the Radiation Oncology Department within 5 minutes. Three more inventories were completed along with surveying all personnel, equipment, packaging, and room surveys for the missing I-125 seed. All personnel were contained within a very small room, and no individual left the room without first being surveyed. An I-125 seed has not been located, and it is our belief that we were shipped only 119 seeds from

copy received by Inspector 2/13/98.

the manufacturer. The manufacturer, Amersham of Arlington Heights, Illinois was notified of the discrepancy and immediately initiated their own internal audit of the shipment. Additional surveys of the room, equipment, and surrounding areas were made and we did not find an I-125 seed. On June 11, 1997, the NRC Region I Medical Licensing Section (Meelan Bhalla) was telephonically notified of the inventory discrepancy by the Radiation Safety Officer Colonel William B. Johnson. Subsequent discussions with Amersham indicate that their records show that the shipment contained 120 seeds. On June 26, 1997, the NRC Operations Center was telephonically notified of the missing seed.

Probable Disposition of the Licensed Material. After our internal investigation, we believe that we were shipped only 119 seeds from Amersham.

Exposure to Individuals. Since we believe that there was an inventory discrepancy, and we were shipped only 119 seeds, there was no loss of byproduct material or exposure to any other individual at Walter Reed Army Medical Center.

Actions Taken to Recover the Material. Extraordinary measures were employed by the Health Physics Office and Radiation Oncology Services in an attempt to locate the seed. The entire cave and all materials in the cave were disassembled and surveyed twice. The room and the adjacent room were also carefully surveyed. No individual left the room without being surveyed.

Actions Taken to Prevent Recurrence. The procedures that Radiation Oncology Services uses to inventory and assay the seeds were carefully reviewed and we feel that they are more than adequate.

For additional information regarding this correspondence, please contact Colonel William B. Johnson, Chief, Health Physics Office, Preventive Medicine Services, at (202) 356-0058.

Sincerely,

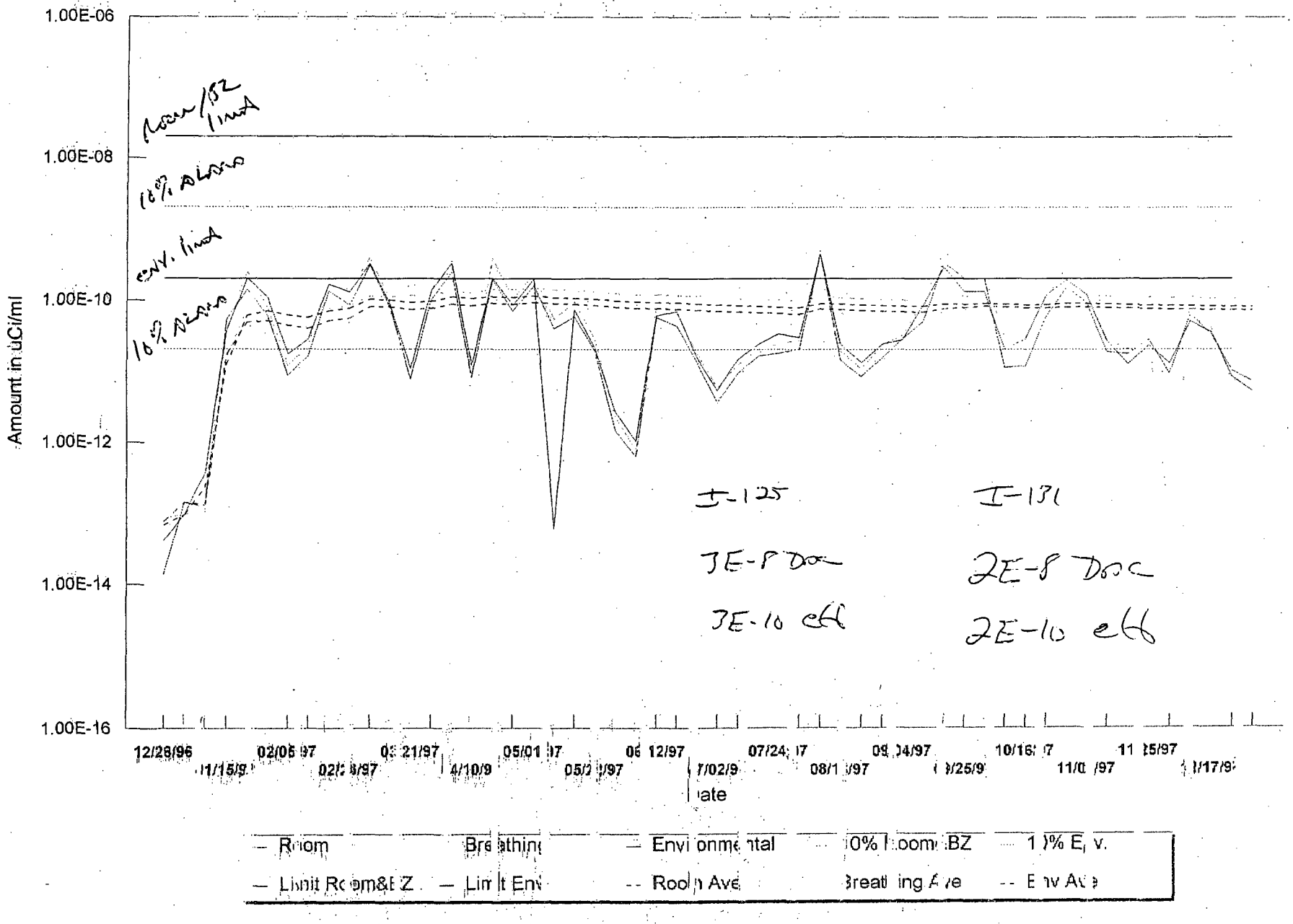
John R. Price Col, MC

Michael J. Kussman
Brigadier General, U.S. Army
Commanding Officer

Copy Furnished:

U.S. Army Medical Command, ATTN: MCHO-CL-W/COL Daxon, 2050 Worth Road, Fort Sam Houston, TX 78234-6000

od ne Ca tri ges fr om Nu cle ar Me ici ne



CHAMMP Report
Sealed Sources Listing by Radionuclide (F352)

ealed ource Key	Radio-nuclide	Current Act (mCi)	Current Act (MegaBq)	Licensee	Location	Last Leak Test Date	Last Inv Test Date	Signoff
S241-AM-17	Am-241	9.715E-05	3.595E-03	Burton, David			10/02/1997	✓
S241-AM-15	Am-241	3.363E-04	1.244E-02	Burton, David			10/02/1997	✓
S241-AM-16	Am-241	9.715E-05	3.595E-03	Burton, David			10/02/1997	✓
S241-AM-14	Am-241	1.371E-04	5.073E-03	Burton, David			10/02/1997	✓
S241-AM-1	Am-241	1.965E+04	7.271E+05	Burton, David		10/14/1997	01/14/1997	✓
S133-BA-4	Ba-133	1.116E-02	4.127E-01	Fishbein, William			10/02/1997	✓
S133-BA-5	Ba-133	1.137E-02	4.207E-01	Burton, David			10/02/1997	✓
S133-BA-11	Ba-133	1.631E-02	6.035E-01	Burton, David			10/02/1997	✓
S133-BA-10	Ba-133	2.106E-01	7.791E+00	Rodriguez, Ana		10/03/1997	01/15/1997	✓
S133-BA-3	Ba-133	1.020E-02	3.775E-01	Gordon, Richard			10/02/1997	✓
3-BA-9	Ba-133	1.249E-02	4.622E-01	Grace, James			10/15/1997	✓
-BA-6	Ba-133	1.068E-02	3.953E-01	Matyas, Gary			10/02/1997	✓
S133-BA-7	Ba-133	1.156E-02	4.279E-01	Pearce, Frederick			10/06/1997	✓
S57-CO-152	Co-57	6.440E-03	2.383E-01	Rodriguez, Ana			10/03/1997	✓
S57-CO-147	Co-57	3.337E-01	1.235E+01	Hess, John		07/08/1997	10/16/1997	✓
S57-CO-137	Co-57	5.565E-04	2.059E-02	Burton, David			10/03/1997	✓
S57-CO-153	Co-57	6.440E-03	2.383E-01	Rodriguez, Ana			10/03/1997	✓
S57-CO-141	Co-57	1.311E-03	4.852E-02	Burton, David			10/03/1997	✓
S57-CO-135	Co-57	5.565E-04	2.059E-02	Burton, David			10/03/1997	✓
S57-CO-140	Co-57	1.311E-03	4.852E-02	Burton, David			10/03/1997	✓
S57-CO-148	Co-57	1.653E+00	6.115E+01	Rodriguez, Ana		07/08/1997	10/03/1997	✓
S57-CO-134	Co-57	5.565E-04	2.059E-02	Burton, David			10/03/1997	✓
S57-CO-149	Co-57	1.116E-02	4.129E-01	Rodriguez, Ana			10/03/1997	✓
S57-CO-150	Co-57	6.440E-03	2.383E-01	Rodriguez, Ana			10/03/1997	✓
S57-CO-132	Co-57	1.209E-01	4.472E+00	Rodriguez, Ana		07/08/1997	10/03/1997	✓
S57-CO-145	Co-57	1.311E-03	4.852E-02	Burton, David			10/03/1997	✓
S57-CO-157	Co-57	1.553E-02	5.746E-01	Rodriguez, Ana			10/03/1997	✓
S57-CO-144	Co-57	1.311E-03	4.852E-02	Burton, David			10/03/1997	✓
S57-CO-158	Co-57	5.739E+00	2.123E+02	Rodriguez, Ana		10/03/1997	07/08/1997	✓
S57-CO-131	Co-57	1.148E-01	4.249E+00	Rodriguez, Ana		07/08/1997	10/03/1997	✓
S57-CO-154	Co-57	1.546E+00	5.720E+01	Rodriguez, Ana		07/08/1997	10/03/1997	✓
S57-CO-159	Co-57	5.329E+00	1.972E+02	Rodriguez, Ana		07/08/1997	10/03/1997	✓
-CO-133	Co-57	1.906E-02	7.052E-01	Burton, David		04/11/1997	10/03/1997	✓
-CO-129	Co-57	5.107E-02	1.889E+00	Rodriguez, Ana		10/03/1997	07/08/1997	✓
S57-CO-155	Co-57	1.553E-02	5.746E-01	Rodriguez, Ana			10/03/1997	✓
S57-CO-142	Co-57	1.311E-03	4.852E-02	Burton, David			10/03/1997	✓
S57-CO-156	Co-57	1.553E-02	5.746E-01	Rodriguez, Ana			10/03/1997	✓
S57-CO-127	Co-57	1.401E-04	5.184E-03	Burton, David			10/06/1997	✓
S57-CO-143	Co-57	1.311E-03	4.852E-02	Burton, David			10/03/1997	✓
S60-CO-1	Co-60	2.185E+05	8.084E+06	Griffea, Tanya		07/10/1997	10/02/1997	✓ Gammacell 220
S60-CO-22	Co-60	4.118E-02	1.524E+00	Rodriguez, Ana			10/03/1997	✓ 2 NUC MED
S60-CO-23	Co-60	5.007E-02	1.852E+00	Rodriguez, Ana			10/03/1997	✓ 3
S60-CO-21	Co-60	3.363E-02	1.244E+00	Burton, David			10/03/1997	✓ - WASTE
S60-CO-17	Co-60	4.869E-04	1.802E-02	Rodriguez, Ana			10/03/1997	✓ NUC MED
S137-CS-10	Cs-137	9.927E+01	3.673E+03	Goldsmith, Brian		07/08/1997	10/02/1997	✓ TX
S137-CS-11	Cs-137	1.985E+02	7.346E+03	Goldsmith, Brian		07/08/1997	10/02/1997	✓ TX
S137-CS-22	Cs-137	1.010E+02	3.738E+03	Goldsmith, Brian		07/08/1997	10/02/1997	✓ TX
S137-CS-36	Cs-137	2.372E-02	8.775E-01	Burton, David			10/03/1997	✓
S137-CS-5	Cs-137	1.416E+02	5.238E+03	Goldsmith, Brian		07/08/1997	10/02/1997	✓ Tx

EX 2

CHAMMP Report
Sealed Sources Listing by Radionuclide (F352)

Sealed Source Key	Radio-nuclide	Current Act (mCi)	Current Act (MegaBq)	Licensee	Location	Last Leak Test Date	Last Inv Test Date	Signoff
SS137-CS-61	Cs-137	2.359E-02	8.728E-01	Taubenberger, Jeffery			10/02/1997	✓
SS137-CS-60	Cs-137	8.643E-02	3.198E+00	Hess, John			10/16/1997	✓
SS137-CS-59	Cs-137	2.639E-02	9.764E-01	Burton, David			10/03/1997	✓
SS137-CS-56	Cs-137	1.823E+06 —	6.744E+07	Shields, Mark		07/08/1997	10/06/1997	✓ BLOOD IRR
SS137-CS-29	Cs-137	2.248E-02	8.317E-01	Burton, David			10/03/1997	✓
SS137-CS-57	Cs-137	2.288E+02 —	8.466E+03	Goldsmith, Brian		07/08/1997	10/02/1997	✓ TX
SS137-CS-58	Cs-137	1.740E-02	6.439E-01	Gist, Irene			10/02/1997	✓
SS137-CS-43	Cs-137	2.470E-02	9.140E-01	Yourick, Debra			10/02/1997	✓
SS137-CS-16	Cs-137	8.119E+01 —	3.004E+03	Goldsmith, Brian		07/08/1997	10/02/1997	✓ TX
SS137-CS-2	Cs-137	4.266E+04 —	1.578E+06	Burton, David		08/30/1994	10/03/1997	✓ CAL SOURCE
SS137-CS-32	Cs-137	1.504E-01	5.565E+00	Rodriguez, Ana		10/03/1997	07/08/1997	✓
7-CS-39	Cs-137	2.438E-02	9.022E-01	Anderson, Sally			10/02/1997	✓
SS137-CS-40	Cs-137	2.439E-02	9.025E-01	Michael, Nelson			10/03/1997	✓
SS137-CS-42	Cs-137	2.468E-02	9.132E-01	Burton, David			10/02/1997	✓
SS137-CS-9	Cs-137	2.012E+06 —	7.445E+07	Griffea, Tanya		07/10/1997	10/02/1997	✓ GAMMACELL 40
SS152-EU-4	Eu-152	1.658E-02	6.134E-01	Abdelrahim, Maged			10/06/1997	✓
SS152-EU-5	Eu-152	1.865E-02	6.899E-01	Tuttle, R.			10/06/1997	✓
SS152-EU-1	Eu-152	1.295E-02	4.793E-01	Tuttle, R.			10/06/1997	✓
SS152-EU-3	Eu-152	1.306E-02	4.833E-01	Abdelrahim, Maged			10/06/1997	✓
SS152-EU-2	Eu-152	1.317E-02	4.873E-01	Tuttle, R.			10/06/1997	✓
SS3-H-1	H-3	7.766E+01	2.873E+03	Burton, David			10/03/1997	✓ GC
SS129-I-25	I-129	2.100E-04	7.770E-03	Burton, David			10/02/1997	✓
SS129-I-30	I-129	1.330E-04	4.921E-03	Burton, David			10/02/1997	✓
SS129-I-36	I-129	1.200E-03	4.440E-02	Burton, David			10/03/1997	✓
SS63-NI-43	Ni-63	1.417E+01	5.243E+02	Burton, David		01/14/1997	10/03/1997	✓ GC
SS63-NI-44	Ni-63	1.409E+01	5.213E+02	Kalasinsky, Victor		07/02/1997	10/02/1997	✓ GC
SS239-PU-1	Pu-239	1.419E-03	5.252E-02	Burton, David			10/02/1997	✓
SS226-RA-59	Ra-226	9.948E-03	3.681E-01	Chiang, Peter			10/02/1997	✓
SS226-RA-86	Ra-226	9.956E-03	3.684E-01	Burton, David			10/03/1997	✓
SS226-RA-61	Ra-226	9.940E-03	3.678E-01	Mayorga, Maria			10/03/1997	✓
SS226-RA-75	Ra-226	1.182E-03	4.372E-02	Burton, David			10/02/1997	✓
SS226-RA-76	Ra-226	9.944E-03	3.679E-01	Saviolakis, George			10/02/1997	✓
26-RA-84	Ra-226	9.956E-03	3.684E-01	Nelson, Lee			10/02/1997	✓
6-RA-72	Ra-226	9.934E-03	3.675E-01	Tai, Yuan-Heng			10/02/1997	✓
SS226-RA-87	Ra-226	9.956E-03	3.684E-01	Jett, Marti			10/14/1997	✓
SS226-RA-D10	Ra-226	9.939E-03	3.678E-01	Burton, David			10/03/1997	✓
SS226-RA-94	Ra-226	9.936E-03	3.676E-01	Burton, David			10/03/1997	✓
SS226-RA-81	Ra-226	9.955E-03	3.683E-01	Lo, Shyh-Ching			10/02/1997	✓
SS226-RA-6	Ra-226	9.927E+00	3.673E+02	Goldsmith, Brian		10/06/1997	04/12/1994	✓
SS226-RA-92	Ra-226	9.957E-03	3.684E-01	Burton, David			10/03/1997	✓
SS226-RA-91	Ra-226	9.961E-03	3.686E-01	Burton, David			10/03/1997	✓
SS226-RA-79	Ra-226	9.945E-03	3.680E-01	Ray, Prabhati			10/15/1997	✓
SS90-SR-3	Sr-90	2.497E+01	9.239E+02	Goldsmith, Brian		07/08/1997	10/02/1997	✓ TX
SS90-SR-2	Sr-90	9.636E+00	3.565E+02	Goldsmith, Brian		07/11/1997	10/02/1997	✓ TX
SS90-SR-13	Sr-90	8.712E+01	3.223E+03	Burton, David		08/30/1994	10/03/1997	✓ WASTE
SS90-SR-11	Sr-90	5.859E+00	2.168E+02	Goldsmith, Brian		07/08/1997	10/02/1997	✓ TX

95 Records Processed

21 + 74

EX 2

TOTAL ISOTOPE INVENTORY FOR WALTER REED ARMY MEDICAL CENTER AS OF 29 JANUARY 1998 (INCLUDES RADIOACTIVE WASTE)			
ISOTOPE	ON HAND ACTIVITY (mCi)	LICENSE LIMIT (mCi)	PERCENT OF LICENSE LIMIT
^{241}Am			95.85
^{241}Am	<0.1		0.00
^{14}C	57.66	2,000	2.88
^{60}Co	0.2		0.04
^{60}Co			0.31
^{51}Cr	20.8	750	2.77
^{137}Cs			54.26
^{137}Cs			38.01
^{137}Cs			23.98
^{137}Cs			0.03
^{137}Cs			28.47
^{3}H	315.7	5,000	6.31
^{125}I	6.6026	2,000	0.33
^{129}I	<0.1	1,000	0.00
^{131}I	3.3	2,000	0.17
^{192}Ir	47.1		
^{99}Mo	3,090	23,000	13.43
^{63}Ni	42.7	1,000	4.27
^{32}P	19.5	2,000	0.96
^{103}Pd	465.9	3,000	15.53
^{239}Pu	<0.1	<0.1	28.39
^{226}Ra	10.1	50	20.11
^{35}S	11.8	1,000	1.18
^{90}Sr	127.7		
^{99m}Tc	697.8	23,000	3.03
^{133}Xe	105.9	2,000	5.30
Atomic No 1-83	58.0876	26,000	0.22
TOTALS			4.95

EX2

TOTAL ISOTOPE INVENTORY FOR WALTER REED ARMY MEDICAL CENTER AS OF 29 JANUARY 1998 FOR ISOTOPES WITH ATOMIC NO. 3-83			
ISOTOPE	ON HAND ACTIVITY (mCi)	LICENSE LIMIT (mCi)	PERCENT OF LICENSE LIMIT
^{133}Ba	0.2827	400	0.07
^{45}Ca	0.7615	400	0.19
^{141}Ce	0.0000	400	0.00
^{36}Cl	0.9680	400	0.20
^{56}Co	0.0058	400	0.00
^{57}Co	17.8433	400	4.46
^{137}Cs	0.07335		
^{152}Eu	0.07458	400	0.02
^{67}Ga	0.0000	400	0.00
^{111}In	0.41	400	0.10
^{22}Na	0.0000	400	0.00
^{33}P	0.9005	400	0.23
^{125}Sb	0.1549	400	0.04
^{46}Sc	0.0000	400	0.00
^{85}Sr	0.0000	400	0.00
^{201}Tl	35.76	400	8.94
^{204}Tl	0.0000	400	0.00
^{90}Y	0.8629		
SUM OF ATOMIC NO 3-83	58.0876		

Ex 2

DEPARTMENT OF THE ARMY
WALTER REED ARMY MEDICAL CENTER
WALTER REED HEALTH CARE SYSTEM
WASHINGTON, DC 20307-5001

REPLY TO
ATTENTION OF

MCHL-HP (340b) 29 January 1999

MEMORANDUM THRU Director, Walter Reed Army Institute of Research (WRAIR)
Chief, Division of Military Casualties Research, WRAIR

FOR LTC Thomas Reid, Chief, Hematology, WRAIR

SUBJECT: Suspension of Privileges to Use Radioactive Material - Radioactive Material Authorization

1. On 28 January 1999, a co-investigator on your Radioactive Material Authorization Number attempted to turn-in a bag of radioactive waste to health physics in room WRAIR. The door was secured when arrived; the health physics technologist left to get the key. When he returned with the key he noticed that had placed the bag on the floor. After checking the bag into the radioactive waste system, he monitored the spot on the floor where the bag had been and found the floor contaminated. The floor was decontaminated so that no removable contamination was present. Mr. Burton, who helped in this effort, returned to the Health Physics Office and I was briefed on the situation. I directed Mr. Burton and CPT Morton of this office to return and very closely monitor the route from room the lab where the waste originated, to room to ensure there was no further contamination. I also directed that the technologist be monitored, as well as the Room No further contamination was found between room and room was still in lab. Contamination was found on the bottom of shoes. The shoes were decontaminated. Significant contamination was very easily detected on the floor in front of the radioactive waste container and in the laboratory hood in lab. The area was marked off and CPT Morton indicated health physics personnel would return early on 29 January 1999 to continue decontamination. On 29 January 1999, discussion of the incident by CPT Morton with continued. finally stated that on 26 January 1999 had started an experiment with 1.6 mCi of ^{32}P. used the centrifuge immediately outside the posted lab. The 1.6 mCi had been divided among 8 vials; 4 of the vials cracked in the centrifuge. terminated the experiment and cleaned up the contamination and monitored the area finding no contamination. CPT Morton monitored the inside of the centrifuge and found significant contamination. The centrifuge has been sealed shut with tape and has been moved back into the posted lab room Note: this centrifuge had previously been located in lab and had been authorized for use with radioactive materials. However, the centrifuge had been monitored for contamination, cleared, deposted for use of radioactive materials, and moved into the hallway outside lab. After clearance and relocation, the use of this centrifuge for radioactive materials was not authorized.

Information in this record was deleted
in accordance with the Freedom of Information
Act, exemptions 2+6
FOIA- 2006-0238

Ex 2 + Ex 6 mn/18

MCHL-HP
SUBJECT: Suspension of Privileges to Use Radioactive Material
Radioactive Material Authorization

2. I was updated on the situation about 1000 and paged LTC Reid, the Principal Investigator for the authorization. We agreed to meet and further discuss the incident with I left the health physics office to inspect the site myself. We stopped by the WRAIR Safety Office to brief Tanya Griffea, the WRAIR Radiation Safety Officer. Ms. Griffea was not in, but Mr. Burt Mueck, the WRAIR Safety Officer was. He Notified COL Crumrine, Director, WRAIR of the incident. COL Crumrine met us at where we discussed the incident. COL McQueen, Chief, Division of Military Casualty Research, and LTC Reid, the Principal Investigator, and were also present. I indicated my serious concerns about the incident. First, the researcher terminated an experiment with 1.6 mCi, and although the amount spilled was less than 1 mCi, notification of health physics should have been a priority. Second, the researcher used a centrifuge in an area not authorized for use of radioactive materials. Third, although records indicated a survey was done of the work area, it was inadequate; the contamination was wide spread, and easily detected in the hood, on the floor in front of the radioactive waste container, and in the centrifuge. Fourth, any researcher cleaning up even a minor spill should monitor their hands and feet very closely after completion of the decontamination should have been able to detect that shoes were contaminated. Because of my serious concerns, I stated to that privileges to use radioactive materials were immediately suspended. A complete investigation of the incident would be presented to the WRAMC Radiation Control Committee (RCC) on 24 February 1999. I stated that we would coordinate for the Occupational Health Clinic to see to provide a sample for bioassay to verify that there was no internal uptake from this incident. Also dosimeters would be collected and sent in for determination of any external exposure. has been seen by Occupation Health Clinic personnel and a bioassay sample taken.

3. In summary the following actions have been directed and are on-going:

a. privileges to use radioactive material have been suspended by myself, the WRAMC Radiation Protection Officer.

b. whole body dosimeter and ring dosimeter will be sent to the Army processing facility to determine any external exposure. A spot urine bioassay sample has been obtained through the Occupational Health Clinic, and will undergo laboratory analysis to determine if there was any internal uptake.

c. A full report of this incident will be presented to the WRAMC RCC. The RCC members will review the actions taken and may recommend further courses of action.

d. Health Physics personnel will support in further decontamination efforts of all affected areas.

Ex 6

e. The Health Physics Office personnel will review lessons learned from this incident and will provide information to all users of radioactive materials through training sessions and distribution of information through the Health Physics Newsletter.

William B. Johnson
WILLIAM B. JOHNSON
COL, MS
Radiation Protection Officer

CF:
DCCS, WRAMC (Chairman, RCC)
Chief, Preventive Medicine, WRAMC
RPO, WRAIR
WRAIR

MCHL-HP 5 February 1999

MEMORANDUM FOR Chairman, Radiation Control Committee

SUBJECT: Decontamination of Room and the Floor Outside Room

1. On 28 January 1999 contamination with radioactive materials was discovered in the hallway outside of Room and in Room The details of the circumstances surrounding this contamination are described in Memorandum, Health Physics Office, MCHL-HP, 29 January 1999, Subject: Suspension of Privileges to Use Radioactive Material, - Radioactive Material Authorization

3. On 1 February 1999, extensive efforts were initiated to remove the fixed contamination from the affected areas. The area outside of was resurveyed in the morning on 1 February. Initial readings in the contaminated area using a Ludlum-3 survey meter were about 1000 counts per minute (cpm) of fixed contamination. The area was repeatedly cleaned with a decontaminating solution and scrubbed with steel wool. After these cleanings, an activity of 400 cpm was measured. Since the area outside of is an unrestricted area, reducing the activity to background levels was a priority. To reduce the activity below 400 cpm, the Department of Public Works (DPW) was contacted to assist in the decontamination effort. DPW personnel used a circular hammer to shave the top layer of concrete off of the floor. All of the shavings and dust were collected using a vacuum cleaner posted for use with radioactive materials. After the area was again cleaned and decontaminated, the activity in the affected area was less than 100 cpm and indistinguishable from background radiation levels. Wet swipes also indicated that no removable contamination remained in the area. DPW patched the concrete in the afternoon.

4. Decontamination efforts were also undertaken in the affected areas of Room A survey was conducted outside of Room the area where the centrifuge was used with radioactive materials. No contamination above background levels could be detected. Contaminated equipment in the laboratory was cleaned until readings were below 200 cpm. Contaminated equipment that could not be cleaned was taken to Building 516, the Health Physics low-level radioactive waste storage and processing facility, and held for decay. This equipment included the centrifuge in which the test tubes broke, several test tube

Ex 2-6

stands, an ice bucket, and other items that would be very difficult to decontaminate. These items will be stored in Building 516 for ten ^{32}P half-lives, approximately six months, and then returned to LTC Reid, Principal User, Radioactive Material Authorization. The entire fume hood was surveyed and affected areas were decontaminated until readings below 200 cpm were achieved.

5. An extensive effort was undertaken to decontaminate the floor of Room. Activity on the tiles near the radioactive waste container measured 2000 cpm of fixed contamination. These tiles were removed. The concrete under the tiles measured 100,000 cpm. This area was repeatedly cleaned with steel wool and cleaning solution until readings of 40,000 cpm were achieved. Further cleaning did not remove any of this remaining contamination. DPW was again called to chip the concrete from the affected area. After about a quarter of an inch of concrete had been removed, the area was cleaned and monitored. An exposure rate of 10,000 cpm was still easily detectable. Chipping more concrete from the affected area did not reduce this activity. Several small cracks were observed in the floor. It is likely that the areas between the cracks were contaminated and that shaving more concrete from the floor would not remove the contamination. Wet swipes confirmed that there was no remaining removable contamination. Analysis of the concrete shavings stripped from the floor confirmed that the contaminant was ^{32}P. Surveys of the ceiling below Room confirmed that the radioactive materials had not leaked through the floor to the room below. The concrete was patched by DPW on 4 February, and the tiles were replaced. A subsequent survey confirmed that less than 200 cpm could be detected on the surface of the patched floor. The remaining fixed contamination under the concrete patch will be fully decayed in six months.

6. Further surveys revealed many other floor tiles which had fixed contamination at levels above 200 cpm. Floor tiles which measured more than 200 cpm were removed and taken to Building 516. In several areas the radioactive materials leaked through the seams in the floor tiles and contaminated the concrete. All of these areas were decontaminated until readings of less than 200 cpm were achieved, and the affected areas were released to LTC Reid.

Ex 2

MCHL-HP
SUBJECT: Decontamination of Room [redacted] and the Floor Outside Room [redacted]

7. On 2 February, CPT Arthur Morton and I briefed COL Crumrine, Director, WRAIR, COL Jarbo, Deputy Director, WRAIR, COL McQueen, Chief, Division of Military Casualty Research, and Ms. Tanya Griffea, Radiation Safety Officer, WRAIR, on the decontamination effort. COL Crumrine suggested having an information briefing for WRAIR personnel to discuss the lessons learned from this incident. Health Physics Office personnel will be available to participate in this briefing at the request of the WRAIR staff.

8. In summary, the following actions have been taken or are on-going:

a. All unrestricted areas affected by this incident have been decontaminated so that radiation levels are indistinguishable from background levels.

b. All restricted areas affected by this incident have been decontaminated so that radiation levels are below 200 cpm.

c. All contaminated equipment that could not be easily decontaminated is being held by Health Physics for decay and will be returned to LTC Reid in six months.

d. An information briefing will be scheduled for WRAIR personnel to discuss lessons learned from this incident.

9. Questions concerning the decontamination efforts or the briefing for WRAIR personnel can be directed to me at 356-0064.

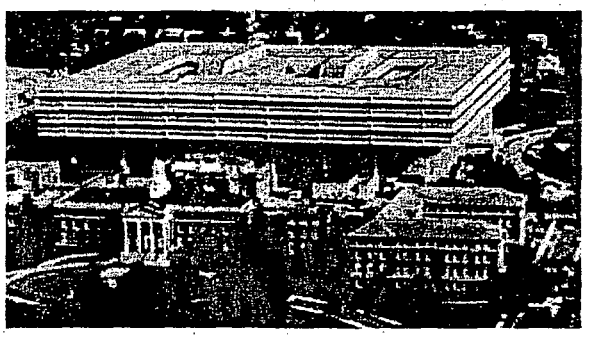
JUSTIN M. HARTINGS
CPT, MS
Health Physics Office

CF:
Director, WRAIR
Deputy Director, WRAIR
Chief, Division of Military Casualties Research, WRAIR
RPO, WRAMC
RPO, WRAIR
Chief, Preventive Medicine, WRAMC
LTC Thomas Reid, Chief, Hematology, WRAIR

Ex 2

WRAMC 1998 Annual Radiation Safety Review

HEALTH PHYSICS OFFICE



Health Physics Office

- Ensure that all operations conducted with ionizing and non-ionizing radiation sources are safe and meet all Federal and Army Regulations and Policies.
- Ensure that all radiation doses to radiation workers, members of the general public, and patients are as low as is reasonably achievable (ALARA) and the releases of radioactive material to the environment are minimized.

Information in this record was deleted in accordance with the Freedom of Information Act, exemptions 2
FOIA- 2006-0238

Portions Ex 2

TAB K

mm/19

MISSION
Health Physics Office

- Provide radiation protection and medical physics support to WRHCS, WRAIR and AFIP
- Act as the executive agent for the WRAMC NRC licenses and DARA
- Provide a Radiological Advisory Medical Team
- Provide regional support to the NARMC

RAMT

- The responsibility for the RAMT mission as outlined in AR 40-13 states that the Commanding General, Walter Reed Medical Center establishes the RAMT with primary responsibility throughout the continental U.S.
- The mission of the RAMT is to assist and furnish radiological health hazard guidance to the on-scene commander or other responsible person at a radiological accident site, and the installation medical authority.

Authorization for Radioactive Material Use

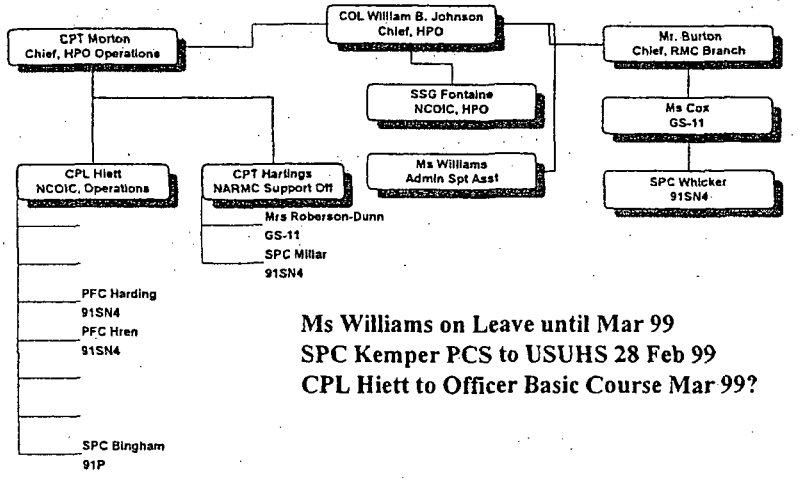
Use of radioisotopes at WRAMC is authorized under:

Nuclear Regulatory Commission (NRC) License # 08-01738-02; Broadscope Type A License for Medical Human and Non-Human Use (expiration 30 June 2004)

Nuclear Regulatory Commission (NRC) License # 08-01738-03; Self-shielded Irradiators (expiration 30 November 2001)

Department of the Army Radioactive Material Authorization (DARA) # 08-01-97 (expiration 30 June 2002)

Health Physics Office Organizational Structure



Ms Williams on Leave until Mar 99
SPC Kemper PCS to USUHS 28 Feb 99
CPL Hiett to Officer Basic Course Mar 99?

WRAMC Dosimetry Program



1998 Dosimetry Program Review

Total Dosimeters Processed	10,668
Whole Body Dosimeters	5,311
Head/Neck Dosimeters	1,975
Extremity Dosimeters	3,331
Fetal Dosimeters	51
Bioassay Measurements	223

Results are extrapolations of data for the first three quarters of CY1998

1998 ALARA Review

	Level I	Level II
Whole Body	125 (3)	>375 (0)
Head/Neck	375 (4)	>1175 (0)
Extremity	1250 (5)	>3750 (2)

1998 Fetal Monitoring

Monitored	11
Receiving > 0 mrem	1
Receiving 0 mrem	10
Average Dose	19 mrem
Dose Range	NA

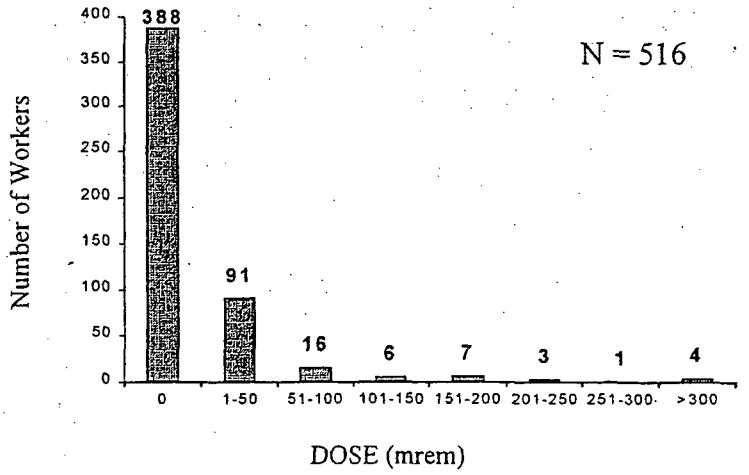
Average dose includes all doses > 0 mrem and results based on extrapolation of data from first three quarters of CY1998

1998 Total Effective Dose Equivalent (TEDE) Monitoring

Monitored	516
Receiving > 0 mrem	128 (25%)
Receiving 0 mrem	388 (75%)
Average Dose	46 mrem
Dose Range	1-601

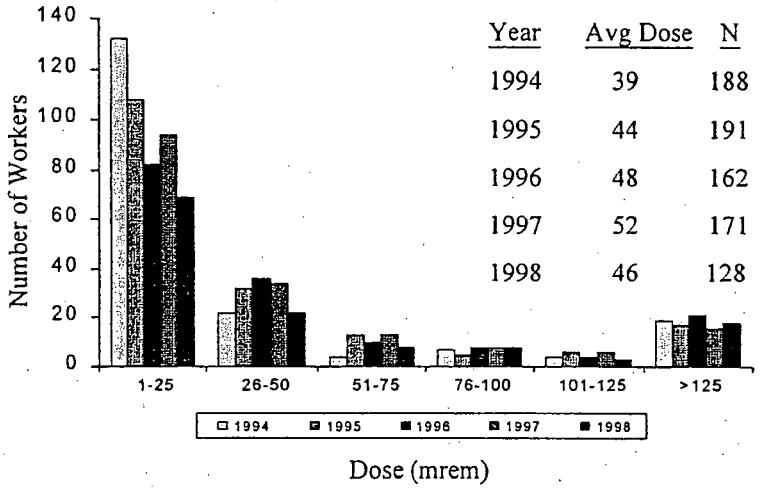
Average dose includes all doses > 0 mrem and results based on extrapolation of data from first three quarters of CY1998

1998 TEDE Doses



Average TEDE dose = 46 mrem and results are based on extrapolation of data from first three quarters of CY1998

94-98 TEDE Dose Comparison



Year	Avg Dose	N
1994	39	188
1995	44	191
1996	48	162
1997	52	171
1998	46	128

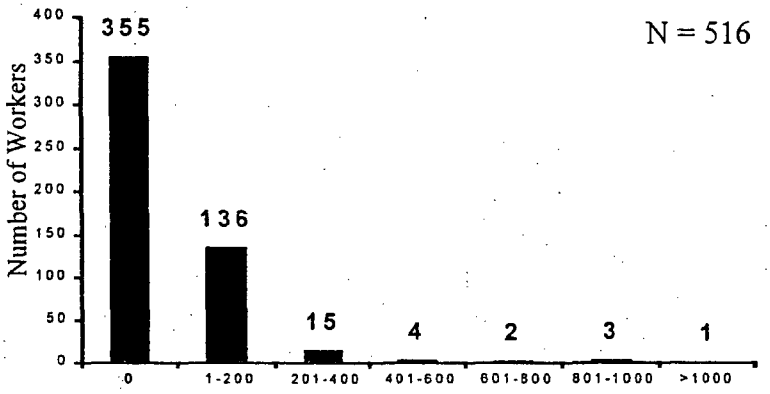
1998 results based on extrapolation of data from first three quarters of CY1998

1998 Lens of Eye Monitoring

Monitored	516
Receiving > 0 mrem	161 (31%)
Receiving 0 mrem	355 (69%)
Average Dose	102 mrem
Dose Range	4-3316 mrem

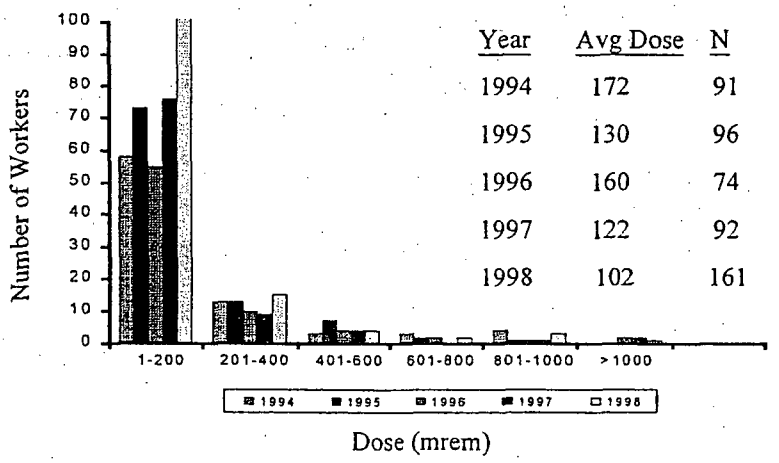
Average dose includes all doses > 0 mrem. Number monitored and average dose are based on extrapolation of data from first three quarters of CY1998

1998 Lens of Eye Doses



Average head and neck dose = 102 mrem and results are based on extrapolation of data from first three quarters of CY1998

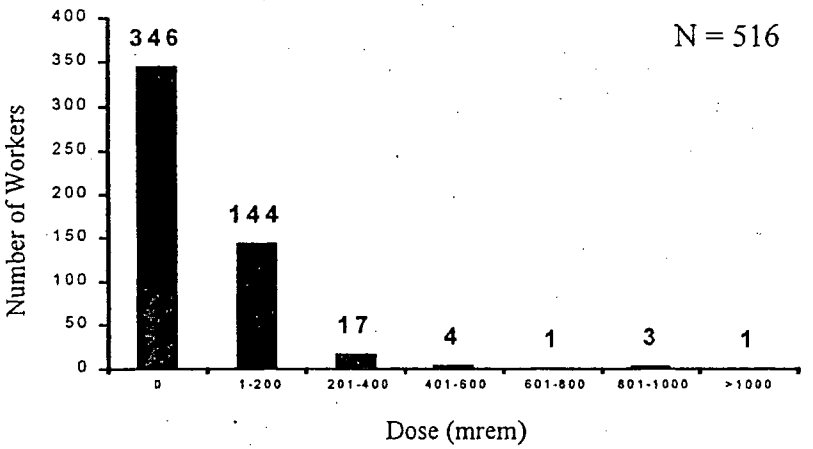
94-98 Lens of Eye Dose Comparison



Year	Avg Dose	N
1994	172	91
1995	130	96
1996	160	74
1997	122	92
1998	102	161

1998 results based on extrapolation of data from first three quarters of CY1998

1998 Skin Radiation Doses



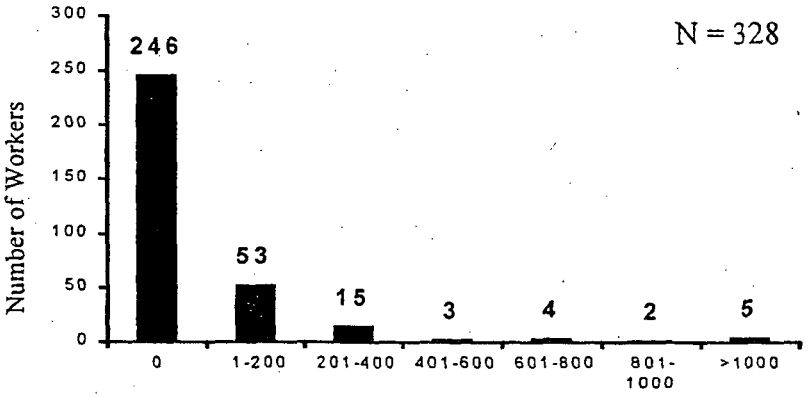
Average extremity dose = 102 mrem and results are based on extrapolation of data from first three quarters of CY1998

1998 Extremity Monitoring

Monitored	**328**
Receiving > 0 mrem	**82 (25%)**
Receiving 0 mrem	**246 (75%)**
Average Dose	**319 mrem**
Dose Range	**12-3876 mrem**

Average dose includes all doses > 0 mrem. Number monitored and average dose are based on extrapolation of data from first three quarters of CY1998

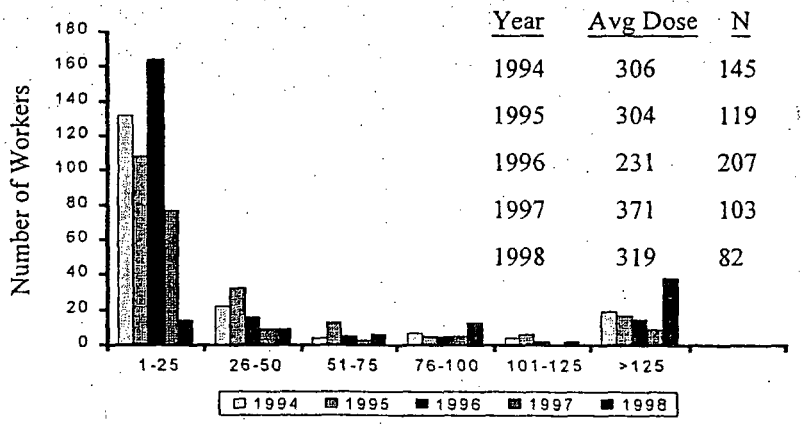
1998 Extremity Radiation Doses



Average extremity dose = 319 mrem and results are based on extrapolation of data from first three quarters of CY1998

94-98 Extremity Dose Comparison

Year	Avg Dose	N
1994	306	145
1995	304	119
1996	231	207
1997	371	103
1998	319	82



1998 results based on extrapolation of data from first three quarters of CY1998

1998 Bioassay Annual Review

Thyroid/Urine Bioassay	
Total Bioassay Measurements	182
Routine Thyroid < 1 mrem (CEDE)	109
Post-therapy Thyroid < 1 mrem (CEDE)	58
Urine < 1 mrem (CEDE)	8
Routine Thyroid > 1 mrem (CEDE)	3
Post-therapy Thyroid > 1 mrem (CEDE)	4

1998 Bioassay Annual Review

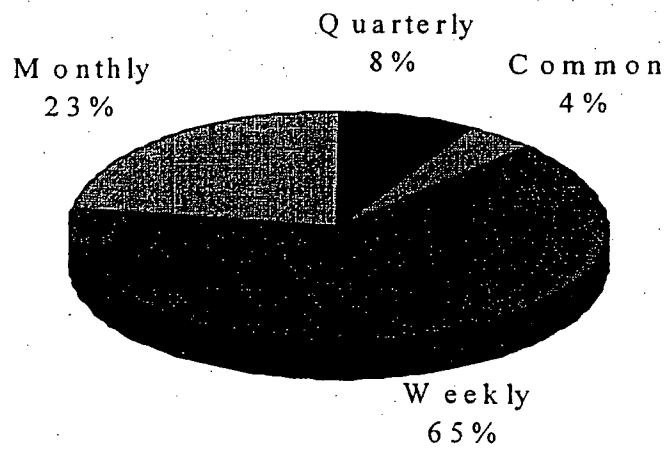
	Dose (mrem)			
ORGAN	HIGHEST	TOTAL	AVERAGE	RANGE
Gonads	.032	.079	.011	.0029 - .032
Breast	.10	.254	.036	.015 - .10
Lung	.80	1.959	.280	.019 - .80
Marrow	.08	.1961	.028	.0071 - .079
Surface	.07	.1788	.025	.0068 - .072
Thyroid	370	856	122.24	7.7 - 370
Remain	.10	.2453	.035	.0053 - .10
Effect	11	27.54	3.93	1.04 - 11

1998 Operational Review

✦ X-Ray Surveys	150
✦ Room Surveys	2279
✦ Air Sample Surveys	179
✦ Therapies Supported	51
✦ Equipment Surveys	45
✦ Laboratory Samples Processed	29,918
✦ Meters Calibrated	327

Room Survey Breakdown

2,279 Total Surveys



1998 Therapy Support

	Brachytherapy	Iodine Ablation	Permanent Implant
Total	6	27	18
Average Therapy Dose	65 mgRaeq	163 mCi	280 mCi
Isotope	Cs-137/Ir-192	I-131	Pd-103
Patients Adjacent	N/A	42	N/A
Patients Exposed	N/A	33	N/A
Range of Dose Received	N/A	0-46 mrad	N/A
Average Dose	N/A	8.5 mrad	N/A

Decommissioning



Decommissioning

Health Physics Office

Forest Glenn	**Bldg 506***	
	Bldg 508	
Rockville	**Gillette 1st Floor***	

CHPPM

Forest Glenn	**Bldg 500 Phase I**	**$75,000**
	Bldg 500 Phase II*	**$50,000**

*** Indicates decommissioning is not complete**

1998 Radiation Safety Training

Training Type	Attendees
HPO Inservice	615
IPRP	115
IRP	178
ALW	345
TOTAL	1,253

HPO Inservices include annual and initial training of radiation workers and special topic seminars both locally and at remote facilities.
IPRP: Introductory Principles of Radiation Protection Course taught by HPO staff
IRP: Initial Radiation Protection Training conducted by Principle Users
ALW: Annual Laboratory Working Training conducted by Principle Users

1998 Radioactive Material Control Review

Sealed Source Inventories	390
Authorization Amendments	120
Authorization Audits	86
Shipments Received	731
Radioactive Waste Shipped (ft^3)	135.5

18-55 gal Drums

1998 Isotope Inventory

TOTAL ISOTOPE INVENTORY FOR WALTER REED ARMY MEDICAL CENTER
AS OF 22 JANUARY 1999 (INCLUDES RADIOACTIVE WASTE)

ISOTOPE	ON HAND ACTIVITY (mCi)	LICENSE LIMIT (mCi)	PERCENT OF LICENSE LIMIT
^{241}Am			95.85
^{241}Am	<0.1		0.00
^{14}C	31.41		1.57
^{60}Co	0.2		
^{60}Co			0.31
^{51}Cr	14.85	750	1.98
^{137}Cs			54.1
^{137}Cs			38.01
^{137}Cs			23.98
^{137}Cs			0.03
^{137}Cs			28.47
^{153}Gd			23.68
^{3}H	249.3	5,000	4.99

Inventory current as of 22 JAN 99

Ex 2

1998 Isotope Inventory

^{125}I	3.85	1,000	0.39
^{125}I	0.1076	1,000	0.01
^{129}I	<0.1	1,000	0.00
^{131}I	15.9	2,000	0.79
^{192}Ir			3.68
^{99}Mo	2,820	23,000	12.26
^{63}Ni	28.3	1,000	2.83
^{32}P	9.27	2,000	0.47
^{103}Pd	12.853	3,000	0.43
^{239}Pu	<0.1	<0.1	28.4
^{226}Ra	10.04	50	20.08
^{35}S	19.99	1,000	2.00
^{90}Sr			25.54
^{99m}Tc	319.9	23,000	1.39
^{133}Xe	41.98	2,000	2.10
Atomic No 1-83	36.8502	26,000	0.14
TOTALS			4.96

Inventory current as of 22 JAN 99

EX 2

1998 Liquid Radioactive Waste

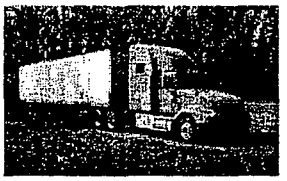
Isotope	Activity Discharged	Regulatory Limit	Percent of Limit
Tritium	252.307 mCi	5000 mCi	5.1 %
Carbon-14	1.154 mCi	1000 mCi	0.1 %
all other	27.010 mCi	1000 mCi	2.7 %

Total activity released to sewer: 280 mCi

Total waste collected: 2,780 liters

No limits of 10 CFR 20.2003 were exceeded





1998 Radioactive Waste Shipments

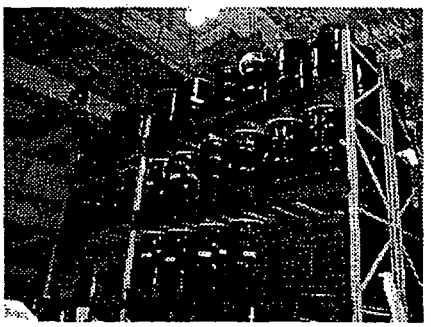
Type	Cubic Feet
Dry Solid Waste	82.5
Organic	4.6
Biological	23
Liquid Scintillation	30
TOTAL	140.1

Note: Waste is shipped in 7.5 ft^3 drums

19 - 55 gal Drum

1998 Radioactive Waste Disposition

Type	mCi
Dry Solid Waste (Shipped)	242.47
Biological Waste (Shipped)	19.26
Biological Waste (Decayed)	1.33
Dry Solid Lab Waste (Decayed)	135.8
Organic Waste (Shipped)	.065
Liquid Scintillation (Shipped)	.67
TOTAL	399.6



1998 Decayed Radioactive Waste

Type	Ft^3
Dry Solid (Lab)	192
Nuclear Medicine & Therapy	376
Laundry	272
Needle Boxes	312
TOTAL	1,152

≈ 154 – 55 gal drum.

Effluent Concentration

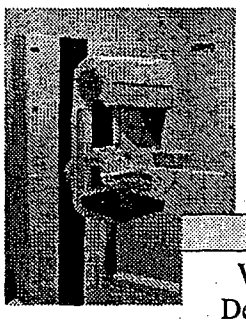
1998 Monitoring Period

Location	I-125 uCi/cm^3 Limit 3E-10	I-131 uCi/cm^3 Limit 2E-10
Building 2 Rm 7A07	4.9 E-12	9.24 E-11
Building 516	2.38 E-13	2.99 E-13

Room Air Concentration

1998 Monitoring Period

Location	I-125 uCi/ml Limit 3E-9	I-131 uCi/ml Limit 2E-9
Building 2 Rm 7A07	4.24 E-12	8.33 E-11
Building 516	1.31 E-13	1.28 E-13



Mammography Quality Standards Act Support

Facility	Location	Equipment
WRAMC	Washington, DC	5 Systems
Dewitt ACH	Ft Belvoir, VA	3 Systems
Kimbrough ACC	Ft Meade, MD	3 Systems
Patterson AHC	Ft Monmouth, NJ	1 System
Dunham AHC	Carlisle Barracks, PA	1 System
McDonald ACH	Ft Eustis, VA	1 System
Kenner ACH	Ft Lee, VA	1 System
Womack AMC	Ft Bragg, NC	3 Systems
Ireland ACH	Ft Knox, KY	2 System
Walson AFH	McGuire AFB, NJ	1 System
	TOTAL	21 Systems

NRC FORM **8C**
(7-94)
NRCMD 3.57

COVER SHEET FOR CORRESPONDENCE

USE THIS COVER SHEET TO PROTECT ORIGINALS OF MULTI-PAGE CORRESPONDENCE

DEPARTMENT OF THE ARMY
OFFICE OF THE SURGEON GENERAL
WASHINGTON, D.C. 20310

REPLY TO
ATTENTION OF

DASG-PSP

19 July 1979

US Nuclear Regulatory Commission
Division of Full Cycle and Material Safety
License Management Branch
Washington, DC 20555

Dear Sirs:

Inclosed are two copies of application for renewal of USNRC Liscense No. 08-01738-02, for Walter Reed Army Medical Center, Washington, DC.

Recommend approval.

Sincerely,

ROBERT T. WANGEMANN, Ph.D.
Colonel, MSC
Radiological Hygiene Consultant

1 Incl
as (2cys)

COPIES SENT TO OFF. OF
INSPECTION AND ENFORCEMENT

FEE EXEMPT

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mm12

FORM NRC-313M (8-78) 10 CFR 35	U.S. NUCLEAR REGULATORY COMMISSION **APPLICATION FOR MATERIALS LICENSE – MEDICAL**	Approved: GAO R0557

INSTRUCTIONS – *Complete Items 1 through 26 if this is an initial application or an application for renewal of a license. Use supplemental sheets where necessary. Item 26 must be completed on all applications and signed. Retain one copy. Submit original and one copy of entire application to : Director, Office of Nuclear Materials Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555. Upon approval of this application, the applicant will receive a Materials License. An NRC Materials License is issued in accordance with the general requirements contained in Title 10, Code of Federal Regulations, Part 30, and the Licensee is subject to Title 10, Code of Federal Regulations, Parts 19, 20 and 35 and the license fee provision of Title 10, Code of Federal Regulations, Part 170. The license fee category should be stated in Item 26 and the appropriate fee enclosed.*

1.a. NAME AND MAILING ADDRESS OF APPLICANT *(institution, firm, clinic, physician, etc.)* INCLUDE ZIP CODE

Department of the Army
Walter Reed Army Medical Center
Washington, DC 20012

TELEPHONE NO.: AREA CODE (202) 576 1100

1.b. STREET ADDRESS(ES) AT WHICH RADIOACTIVE MATERIAL WILL BE USED *(If different from 1.a.)* INCLUDE ZIP CODE

See attached Tab 1.B

2. PERSON TO CONTACT REGARDING THIS APPLICATION

LTC Robert M. Quillin
Health Physics Officer, WRAMC
TELEPHONE NO.: AREA CODE (301) 427 5107

3. THIS IS AN APPLICATION FOR: *(Check appropriate item)*

a. ☐ NEW LICENSE
b. ☐ AMENDMENT TO LICENSE NO. _____
c. ☒ RENEWAL OF LICENSE NO. 08-01738-02

4. INDIVIDUAL USERS *(Name individuals who will use or directly supervise use of radioactive material. Complete Supplements A and B for each individual.)*

Individuals approved by the Radiation Control Committee, Walter Reed Army Medical Center

5. RADIATION SAFETY OFFICER (RSO) *(Name of person designated as radiation safety officer. If other than individual user, complete resume of training and experience as in Supplement A.)*

LTC Robert M. Quillin
Ref: AR 40-14 and AR 40-37
The Health Physics Officer will be appointed by the Commanding General, Walter Reed Army Medical Center

6.a. RADIOACTIVE MATERIAL FOR MEDICAL USE

RADIOACTIVE MATERIAL LISTED IN:	ITEMS DESIRED "X"	MAXIMUM POSSESSION LIMITS (In millicuries)
10 CFR 31.11 FOR IN VITRO STUDIES		
10 CFR 35.100, SCHEDULE A, GROUP I		AS NEEDED
10 CFR 35.100, SCHEDULE A, GROUP II		AS NEEDED
10 CFR 35.100, SCHEDULE A, GROUP III		
10 CFR 35.100, SCHEDULE A, GROUP IV		AS NEEDED
10 CFR 35.100, SCHEDULE A, GROUP V		AS NEEDED
10 CFR 35.100, SCHEDULE A, GROUP VI		

ADDITIONAL ITEMS:	MARK ITEMS DESIRED "X"	MAXIMUM POSSESSION LIMITS (In millicuries)
IODINE-131 AS IODIDE FOR TREATMENT OF HYPERTHYROIDISM		
PHOSPHORUS-32 AS SOLUBLE PHOSPHATE FOR TREATMENT OF POLYCYTHEMIA VERA, LEUKEMIA AND BONE METASTASES		
PHOSPHORUS-32 AS COLLOIDAL CHROMIC PHOSPHATE FOR INTRACAVITARY TREATMENT OF MALIGNANT EFFUSIONS.		
GOLD-198 AS COLLOID FOR INTRACAVITARY TREATMENT OF MALIGNANT EFFUSIONS.		
IODINE-131 AS IODIDE FOR TREATMENT OF THYROID CARCINOMA		
XENON-133 AS GAS OR GAS IN SALINE FOR BLOOD FLOW STUDIES AND PULMONARY FUNCTION STUDIES.		

6.b. RADIOACTIVE MATERIAL FOR USES NOT LISTED IN ITEM 6.a. *(Sealed sources up to 3 mCi used for calibration and reference standards are authorized under Section 35.14(d), 10 CFR Part 35 , and NEED NOT BE LISTED.)*

ELEMENT AND MASS NUMBER	CHEMICAL AND/OR PHYSICAL FORM	MAXIMUM NUMBER OF MILLICURIES OF EACH FORM	DESCRIBE PURPOSE OF USE
See attached Tab 6.B			

00641

FORM NRC-313M (8-78) 10 CFR 35	U.S. NUCLEAR REGULATORY COMMISSION **APPLICATION FOR MATERIALS LICENSE – MEDICAL**	Approved: GAO R0557

INSTRUCTIONS – *Complete Items 1 through 26 if this is an initial application or an application for renewal of a license. Use supplemental sheets where necessary. Item 26 must be completed on all applications and signed. Retain one copy. Submit original and one copy of entire application to : Director, Office of Nuclear Materials Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555. Upon approval of this application, the applicant will receive a Materials License. An NRC Materials License is issued in accordance with the general requirements contained in Title 10, Code of Federal Regulations, Part 30, and the Licensee is subject to Title 10, Code of Federal Regulations, Parts 19, 20 and 35 and the license fee provision of Title 10, Code of Federal Regulations, Part 170. The license fee category should be stated in Item 26 and the appropriate fee enclosed.*

1.a. NAME AND MAILING ADDRESS OF APPLICANT *(institution, firm, clinic, physician, etc.)* INCLUDE ZIP CODE	1.b. STREET ADDRESS(ES) AT WHICH RADIOACTIVE MATERIAL WILL BE USED *(If different from 1.a.)* INCLUDE ZIP CODE
Department of the Army Walter Reed Army Medical Center Washington, DC 20012 TELEPHONE NO.: AREA CODE (202) 576 1100	See attached Tab 1.B
2. PERSON TO CONTACT REGARDING THIS APPLICATION LTC Robert M. Quillin Health Physics Officer, WRAMC TELEPHONE NO.: AREA CODE (301) 427 5107	3. THIS IS AN APPLICATION FOR: *(Check appropriate item)* a. ☐ NEW LICENSE b. ☐ AMENDMENT TO LICENSE NO. _____ c. ☒ RENEWAL OF LICENSE NO. 08-01738-02
4. INDIVIDUAL USERS *(Name individuals who will use or directly supervise use of radioactive material. Complete Supplements A and B for each individual.)* Individuals approved by the Radiation Control Committee, Walter Reed Army Medical Center	5. RADIATION SAFETY OFFICER (RSO) *(Name of person designated as radiation safety officer. If other than individual user, complete resume of training and experience as in Supplement A.)* LTC Robert M. Quillin Ref: AR 40-14 and AR 40-37 The Health Physics Officer will be appointed by the Commanding General, Walter Reed Army Medical Center

6.a. RADIOACTIVE MATERIAL FOR MEDICAL USE

RADIOACTIVE MATERIAL LISTED IN:	ITEMS DESIRED "X"	MAXIMUM POSSESSION LIMITS *(In millicuries)*
10 CFR 31.11 FOR IN VITRO STUDIES		
10 CFR 35.100, SCHEDULE A, GROUP I		AS NEEDED
10 CFR 35.100, SCHEDULE A, GROUP II		AS NEEDED
10 CFR 35.100, SCHEDULE A, GROUP III		
10 CFR 35.100, SCHEDULE A, GROUP IV		AS NEEDED
10 CFR 35.100, SCHEDULE A, GROUP V		AS NEEDED
10 CFR 35.100, SCHEDULE A, GROUP VI		

ADDITIONAL ITEMS:	MARK ITEMS DESIRED "X"	MAXIMUM POSSESSION LIMITS *(In millicuries)*
IODINE-131 AS IODIDE FOR TREATMENT OF HYPERTHYROIDISM		
PHOSPHORUS-32 AS SOLUBLE PHOSPHATE FOR TREATMENT OF POLYCYTHEMIA VERA, LEUKEMIA AND BONE METASTASES		
PHOSPHORUS-32 AS COLLOIDAL CHROMIC PHOSPHATE FOR INTRACAVITARY TREATMENT OF MALIGNANT EFFUSIONS.		
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IODINE-131 AS IODIDE FOR TREATMENT OF THYROID CARCINOMA		
XENON-133 AS GAS OR GAS IN SALINE FOR BLOOD FLOW STUDIES AND PULMONARY FUNCTION STUDIES.		

6.b. RADIOACTIVE MATERIAL FOR USES NOT LISTED IN ITEM 6.a. *(Sealed sources up to 3 mCi used for calibration and reference standards are authorized under Section 35.14(d), 10 CFR Part 35 , and NEED NOT BE LISTED.)*

ELEMENT AND MASS NUMBER	CHEMICAL AND/OR PHYSICAL FORM	MAXIMUM NUMBER OF MILLICURIES OF EACH FORM	DESCRIBE PURPOSE OF USE
See attached Tab 6.B			

00641

24. PERSONNEL MONITORING DEVICES

TYPE (Check appropriate box)			SUPPLIER	EXCHANGE FREQUENCY
a. WHOLE BODY	X	FILM	Lexington-Bluegrass Army Depot Lexington, KY	Monthly/quarterly
		TLD		
		OTHER (Specify)		
b. FINGER		FILM		
	X	TLD	R.S. Landauer, Jr. and Co	Monthly
		OTHER (Specify)		
c. WRIST	X	FILM	Lexington-Bluegrass Army Depot Lexington, KY	Monthly/quarterly
		TLD		
		OTHER (Specify)		

d. OTHER (Specify)

See attached Tab 24

25. FOR PRIVATE PRACTICE APPLICANTS ONLY

a. HOSPITAL AGREEING TO ACCEPT PATIENTS CONTAINING RADIOACTIVE MATERIAL

NAME OF HOSPITAL

MAILING ADDRESS

CITY | STATE | ZIP CODE

b. ATTACH A COPY OF THE AGREEMENT LETTER SIGNED BY THE HOSPITAL ADMINISTRATOR.

c. WHEN REQUESTING THERAPY PROCEDURES, ATTACH A COPY OF RADIATION SAFETY PRECAUTIONS TO BE TAKEN AND LIST AVAILABLE RADIATION DETECTION INSTRUMENTS.

26. CERTIFICATE

(This item must be completed by applicant)

The applicant and any official executing this certificate on behalf of the applicant named in Item 1a certify that this application is prepared in conformity with Title 10, Code of Federal Regulations, Parts 30 and 35, and that all information contained herein, including any supplements attached hereto, is true and correct to the best of our knowledge and belief.

a. LICENSE FEE REQUIRED
(See Section 170.31, 10 CFR 170)

(1) LICENSE FEE CATEGORY:

(2) LICENSE FEE ENCLOSED: $ Exempt

b. APPLICANT OR CERTIFYING OFFICIAL *(Signature)*

(1) NAME *(Type or Print)*
FRANKLIN J. GORDUP
MAJ, MSC

(2) TITLE
Adjutant

c. DATE
18 July 1979

FORM NRC-313M (8-78)

PRIVACY ACT STATEMENT

Pursuant to 5 U.S.C. 552a(e)(3), enacted into law by section 3 of the Privacy Act of 1974 (Public Law 93-579), the following statement is furnished to individuals who supply information to the Nuclear Regulatory Commission on Form NRC-313M. This information is maintained in a system of records designated as NRC-3 and described at 40 Federal Register 45334 (October 1, 1975).

1. **AUTHORITY** Sections 81 and 161(b) of the Atomic Energy Act of 1954, as amended (42 U.S.C. 2111 and 2201(b)).

2. **PRINCIPAL PURPOSE(S)** The information is evaluated by the NRC staff pursuant to the criteria set forth in 10 CFR Parts 30-36 to determine whether the application meets the requirements of the Atomic Energy Act of 1954, as amended, and the Commission's regulations, for the issuance of a radioactive material license or amendment thereof.

3. **ROUTINE USES** The information may be used: (a) to provide records to State health departments for their information and use; and (b) to provide information to Federal, State, and local health officials and other persons in the event of incident or exposure, for their information, investigation, and protection of the public health and safety. The information may also be disclosed to appropriate Federal, State, and local agencies in the event that the information indicates a violation or potential violation of law and in the course of an administrative or judicial proceeding. In addition, this information may be transferred to an appropriate Federal, State, or local agency to the extent relevant and necessary for a NRC decision or to an appropriate Federal agency to the extent relevant and necessary for that agency's decision about you. A copy of the license issued will routinely be placed in the NRC's Public Document Room, 1717 H Street, N.W., Washington, D.C.

4. **WHETHER DISCLOSURE IS MANDATORY OR VOLUNTARY AND EFFECT ON INDIVIDUAL OF NOT PROVIDING INFORMATION** Disclosure of the requested information is voluntary. If the requested information is not furnished, however, the application for radioactive material license, or amendment thereof, will not be processed.

5. **SYSTEM MANAGER(S) AND ADDRESS** Director, Division of Fuel Cycle and Material Safety, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555.

ITEM 1

ADDRESS(ES) AT WHICH RADIOACTIVE MATERIAL WILL BE USED

nmlizla

TAB ITEM 1. B

(1) Walter Reed Army Medical Center, Washington, D.C. 20012

(2) Walter Reed Army Medical Center, Forest Glen Section and Annex
Silver Spring, Maryland 20910

(3) U.S. Army Medical Research Institute for Infectious Diseases
Fort Detrick, Fredrick, Maryland 21701

(4) Andrew Rader Army Clinic, Fort Myer, Virginia 22211

(5) Walter Reed Army Institute of Research Animal Holding Facility
Fort Meade, Maryland 20755

(6) U.S. Army Medical Laboratory, Walter Reed Army Medical Center
Department of Pathology, Fort Meade, Maryland 20755

(7) U.S. Army Institute of Dental Research Facility,
Fort Meade, Maryland 20755

ITEM 6

RADIOACTIVE MATERIAL FOR USES NOT LISTED

Information in this record was deleted
in accordance with the Freedom of Information
Act, exemptions 2
FOIA- 2006-0237

Ex 2 portions

11/12/06

TAB ITEM 6.B.

	ELEMENT AND MASS NUMBER	CHEMICAL FORM	MAX NO mCi	PURPOSE
A.	Any byproduct material with atomic Nos. 3-83 inclusive	Any	400 each except:	Medical research and development as defined in Section 30.4, Title 10, Code of Federal Regulations, Part 30 and Human Use as defined in Section 35.3, Title 10, Code of Federal Regulations, Part 35.
	Iodine 131	Any	1000	" "
	Xenon- 133	"	1000	" "
	Krypton 85	"	1000	" "
	Gold 198	"	1000	" "
	Phosphorus 32	"	2000	" "
	Carbon 14	"	2000	" "
	Iodine 125	"	1000	" "
	Iridium 192	"	[redacted]	" "
	Chromium 51	"	750	" "
			Total not to exceed 26 curies	
B.	Hydrogen 3	Any	5000	" "
C.	Cesium 137	[redacted]	[redacted]	" "
D	Molybdenum 99	Mo99/Tc 99m Generators	10,000	" "
E.	Technetium 99m	Pertechnate	5000	" "
F.	Cesium 137	[redacted]	[redacted]	Instrument calibration check

Ex 2

AB ITEM 6.B. Continued

LEMENT AND MASS NUMBER	CHEMICAL FORM	MAX NO mCi	PURPOSE
. Americium 241	Any	0.1	Research & Development as defined in
. Polonium 210	"	15	Sec 30.4(q), 10 CFR 30,
. Cesium 137			"Rules of General Applicability to Licensing of Byproduct Material"
. Cobalt 60	Sealed sources	500 total	" "
. Cesium 137			In instrument calibration of instruments
. Americium 241		total	Medical research
. Americium 241	Any		Standards and ref. sources
. Iodine 125	Sealed source (Norland Inst Co. Model 178A591A)	400 total	Medical diagnosis
Iodine 125	Sealed source (3M Company Brand Seeds)	500	Human Use as defined in Sec 35.3, 10 CFR 35 "Human Uses of Byproduct Material"
. Nickel 63	Gas chromatography sources (Listed below)	1000	Medical research

Activity (mCi)	Serial No.	Manufacturer & Model
15	001	
180	A333	Hewlett-Packard 2-6195
2	A864	" "
2	A977	" "
2	A1011	" "
2	A1421	" "
2	A1354	" "
2	2872	" 111019-0001
2	A1365	" 2-6195
2	A1419	" "
200	1354	" 2-2837
15	C0409	" 1880360520
10	GC16308	Perkin-Elmer 900

Ex 2

TAB ITEM 6.B. Continued

ELEMENT AND MASS NUMBER	CHEMICAL FORM	MAX NO mCi	PURPOSE
O. Nickel 63 (CONT'D)	Gas chromatography sources (Listed below)	1000	Medical research

Activity (mCi)	Serial No.	Manufacturer & Model
13	3123	
13	3099	
15	5334	
15	5761	
15	130A01870	Hewlett-Packard 5700A
15	1816A05616	" "

P.	Uranium	Any	50 Kilograms	Teaching, laboratory research
Q.	Uranium	Uranium depleted in U-235	280 Kilograms	Shielding
R.	Thorium	Any	5 Kilograms	Teaching, laboratory research

ITEM 7

MEDICAL ISOTOPES COMMITTEE

Information in this record was deleted
in accordance with the Freedom of Information
Act, exemptions 6
FOIA- 2006-0258

Portions Ex 6 nn/12/c

WRAMC Regulation
40-34

17 July 1979

E X T R A C T

* * *

15. RADIATION CONTROL COMMITTEE

a. Purpose: To formulate rules and procedures necessary to minimize the hazards due to ionizing and non-ionizing radiation, and to insure compliance with regulations and standards established by Regulatory bodies. Specifically, the committee will: (1) Advise the commander, WRAMC on radiation hazards; (2) Prepare, amend, and/or review rules and regulations pertaining to the receipt, possession, use, storage and transfer of radioactive materials; (3) Provide for the review of and authorization for all uses of radioactive materials; (4) review incidents involving the usage of radioactive material which result in overexposure to personnel; (5) recommend appropriate actions to be taken when there is failure to observe radiation protection recommendations, rules, and regulations.

HQ WRAMC

Deputy Commander (Chairperson)
Chief, Department of Medicine (Member)
Chief, Department of Nursing (Member)
Chief, Department of Pathology (Member)
Chief, Department of Radiology (Member)
Chief, Preventive Medicine Activity (Member)
Chief, Radiation Therapy Service (Member)
Chief, Nuclear Medicine Service (Member)
Chief, Biomedical Engineering (Member)
Health Physics Officer (RPO) (Member)
Clinical Radiological Physicist (Member)
Senior Nuclear Pharmacist (Member)
Assistant Health Physics Officer (Alternate RPO) (Recorder)
Director, Directorate of Industrial Operations (Non-Voting Member)
Center Judge Advocate (Non-Voting Member)

WRAIR

Director, WRAIR (Member)
Radiation Safety Officer (Member)

WRAMC Regulation
40-34 (Extract - Para 15)

17 July 1979

AFIP

Chairperson, AFIP Radioisotope Committee
(Member)
Radiation Protection Officer (Member)

USAMRIID

Scientific Advisor, USAMRIID (Member)

b. Frequency: Quarterly

c. Reports: Reports will be submitted to the Recorder of the Executive Committee within 5 working days following each meeting.

* * *

HEALTH PHYSICS
WALTER REED ARMY MEDICAL CENTER
Washington, D.C. 20012

HSWP-QHP
MEMO Number 4

30 April 1979

ORGANIZATION AND FUNCTION
OF THE
RADIATION CONTROL COMMITTEE SUBCOMMITTEES

1. REFERENCES

a. Title 10, Chapter 1, Code of Federal Regulations, "Energy - U.S. Nuclear Regulatory Commission Rules and Regulations".

b. WRAMC US NRC License 08-01738-02.

c. WRAMC Regulation 40-34, "Health Care Committees".

2. DISCUSSION

Reference a. above stipulates that no individual may receive, acquire, own, possess, use, or transfer radioactive materials unless authorized by the Nuclear Regulatory Commission (NRC) via a Specific NRC License. At present, WRAMC possesses a "Specific NRC License of Broad Scope for By-Product Material" that allows WRAMC to utilize certain types and quantities of radioactive material for the purpose specified therein. One of the NRC requirements for possession of the current license stipulates that WRAMC must establish a radiation safety committee that exercises administrative control over the safe use of radioactive materials. In order to fulfill this requirement, WRAMC has established the Radiation Control Committee (RCC) with responsibility and authority for assuring the safe use of ionizing radiation at WRAMC and certain tenant activities. The primary method used by the WRAMC RCC to fulfill its responsibilities for administrative supervision of licensed radioactive materials is via the review process associated with WRAMC Radioactive Material Authorizations applications. RCC safety evaluations of the proposed uses of radioactive material, which take into consideration such matters as the adequacy of facilities and equipment, training and experience of the user, and the operating or handling procedures, are necessary in order for the RCC to accomplish its function and mandatory if WRAMC desires to possess a NRC License for radioactive material.

CONTENTS OF THIS MEMO WERE APPROVED BY THE WRAMC RADIATION CONTROL COMMITTEE ON 11 APRIL 1979

3. SUBCOMMITTEE PURPOSES, FUNCTIONS AND ORGANIZATION

a. Standing Subcommittees are as follows:

(1) Subcommittee for Human Use of Ionizing Radiation (Annex A)

(2) Subcommittee for Non-Human Use of Ionizing Radiation (Annex B)

(3) Subcommittee for Medical Evaluation of Radiation Workers (Annex C)

b. Special Subcommittees

Special subcommittees are appointed by the Radiation Control Committee as required.

c. Membership on Subcommittees

(1) Determined by areas of special competence or training as required by purpose for subcommittee.

(2) Individuals are nominated and approved by the Radiation Control Committee at its quarterly meeting. Individuals nominated and approved need not be members of the Radiation Control Committee.

d. Chairperson of Subcommittee

(1) Should be a member of the Radiation Control Committee.

(2) Appointed by the Chairperson, Radiation Control Committee.

e. Meetings of Subcommittees

(1) Time/Frequency: As required.

(2) Quorum: Consists of more than 50% of the designated members of the subcommittee.

(3) Voting: All designated members of the subcommittee will vote on issues brought before the subcommittee requiring action. Members with a vested interest in a particular issue will disqualify themselves from voting on that issue.

(4) Reports: At quarterly Radiation Control Committee Meeting.

4. RADIATION MATERIAL AUTHORIZATIONS

The Radioactive Material Authorization Application review process is outlined in Annex D.

ROBERT M. QUILLIN
LTC, MSC
Health Physics Officer

ANNEXES
A - Subcommittee for Human Use of Ionizing Radiation
B - Subcommittee for Non-Human Use of Ionizing Radiation
C - Subcommittee for Medical Evaluation of Radiation Workers
D - Radioactive Materials Authorization Review Procedure

HSWP-QHP
MEMO Number 4

30 April 1979

ANNEX A

SUBCOMMITTEE FOR THE HUMAN USE OF IONIZING RADIATION

1. PURPOSE

a. To review proposals/requests for the human use of ionizing radiation and to recommend approval/disapproval.

b. To give interim approval/disapproval on requests for the human use of ionizing radiation and make recommendations to the RCC.

c. To consider, make recommendations on, act on all other matters referred to it by the Radiation Control Committee.

2. MEMBERSHIP. The subcommittee for Human Use of Ionizing Radiation shall consist of at least the following six (6) individuals:

a. A person with special competence in health physics and radiation safety.

b. A physician recognized as a specialist in radiation therapy.

c. A physician recognized as a specialist in nuclear medicine.

d. A person qualified by training and experience to formulate radioactive drugs.

e. A physician with special competence in internal medicine or hematology.

f. A representative of the Judge Advocate's Office.

Additional members may be appointed to the subcommittee in order to achieve sufficient diversity in the membership. These members shall be qualified in various disciplines pertinent to the field of human use of ionizing radiation (e.g. radiation biology, radiation physics, clinical pathology, radiology and endocrinology).

HSWP-QHP
MEMO Number 4

30 April 1979

ANNEX B

SUBCOMMITTEE FOR NON-HUMAN USE OF IONIZING RADIATION

1. PURPOSE

a. To review proposals/requests for Non-Human Use of Ionizing Radiation and to recommend approval/disapproval.

b. To give interim approval/disapproval and make recommendations to the RCC for non-human use of ionizing radiation.

c. To consider, make recommendations on, act on all other matters referred to it by the Radiation Control Committee.

2. MEMBERSHIP. The subcommittee for non-human use of ionizing radiation shall consist of at least the following five (5) individuals:

a. A person with special competence in health physics and radiation safety.

b. A person with special competence in the research applications of radiation.

c. A physician recognized as a specialist in the diagnostic or therapeutic uses of radioisotopes.

d. A person with special competence in chemistry, biochemistry, or veterinary medicine.

e. A person with special competence in radiation physics or radiation biophysics.

Additional members may be appointed to the subcommittee in order to achieve sufficient diversity in the membership. These members shall be qualified in various disciplines pertinent to the field of non-human uses of ionizing radiation.

HSWP-QHP
MEMO Number 4

30 April 1979

ANNEX C

SUBCOMMITTEE OR MEDICAL EVALUATION OF RADIATION WORKERS

1. PURPOSE

a. To determine the type and frequency of periodic examinations required for radiation workers taking into account the nature and magnitude of the potential radiation exposure.

b. To determine the medical examinations and tests to be given in the event of a suspected or actual overexposure to ionizing radiation.

c. To review programs for the medical evaluation of radiation workers.

d. To consider, make recommendations on, act on all other matters referred to it by the Radiation Control Committee.

2. MEMBERSHIP. The subcommittee for medical evaluation of radiation workers shall consist of at least the following individuals:

a. A physician recognized as a specialist in internal medicine.

b. A physician recognized as a specialist in preventive medicine or occupational health.

c. A physician expert in the diagnostic or therapeutic uses of radiation sources.

d. A person with special competence in health physics and radiation safety.

e. A person with special competence in radiation biology.

Additional members may be appointed to the subcommittee in order to achieve sufficient diversity in membership. These members shall be qualified in various disciplines pertinent to medical evaluation of radiation workers.

HSWP-QHP
MEMO Number 4 30 April 1979

ANNEX D

RADIOACTIVE MATERIALS AUTHORIZATION REVIEW PROCEDURE

1. DISCUSSION. Each individual desiring to use radioactive materials at WRAMC must obtain the approval of the Radiation Control Committee prior to ordering, using or possessing radioactive materials. Such approval will be signified by Radioactive Materials Authorizations.

2. PURPOSE. The purpose of this Annex is to set forth procedures necessary to assure timely and orderly consideration of applications for Radioactive Materials Authorizations.

3. RESPONSIBILITIES. (See flow chart, Incl 1)

a. Each person desiring to obtain or maintain status as a Principal User must obtain an "application packet" containing necessary forms and instructions from the Health Physics Office. The Health Physics Office will notify each Principal User that his current authorization is due to expire approximately 60 days prior to expiration date. Each authorization expires one year from date of issue.

b. The applicant will complete the necessary forms and return them to the Health Physics Office within 30 days. The Health Physics Office will review each application to ensure that:

(1) Individuals listed on the application have sufficient training and experience to safely conduct the proposed procedures.

(2) Proposed procedures do not violate applicable regulations.

(3) Facilities and equipment at the proposed work site provide an adequate margin of safety for individuals performing the procedure and for public safety.

Unacceptable applications are returned to the applicant for correction or modification. Approved applications are signed by the WRAMC Health Physics Officer and transmitted to the appropriate Radiation Control Subcommittee with a recommended list of conditions that should apply to the approved authorization.

c. The Radiation Control Subcommittee reviews each application to assure compliance with established procedures, precedents and regulations.

Unacceptable applications are returned to the applicant via the Health Physics Office. Approved applications are signed by the Chairperson of the appropriate Radiation Control Subcommittee and transmitted to the applicant via the Health Physics Office.

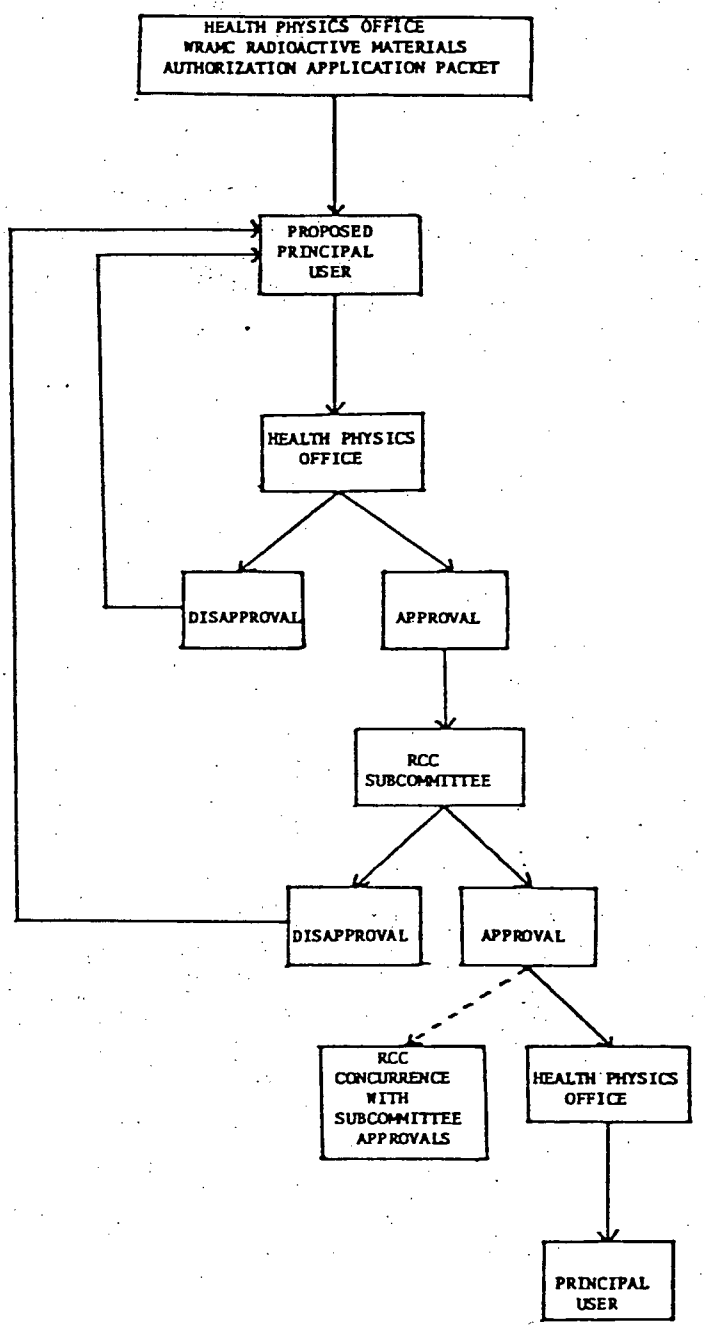
d. Upon receipt of a WRAMC Radioactive Material Authorization that has been approved by both the WRAMC Health Physics Office and the Chairperson of the appropriate Radiation Control Subcommittee, the applicant attains the status of Principal User and may utilize radioactive materials as specified in the Authorization.

e. Each Radiation Control Subcommittee Chairperson presents the WRAMC Radiation Control Committee (RCC) with summaries of all WRAMC Radioactive Material Authorizations that have beem processed between the quarterly RCC meetings and solicits concurrence with the decisions made by the subcommittee and Health Physics Office.

f. Final action on each authorization will be taken on each authorization presented to the Radiation Control Committee during quarterly meetings.

4. The Radiation Control Committee is the final approving authority for Radioactive Materials Authorizations and will adjudicate any conflicts between the Health Physics Office and Radiation Control Committee Subcomittee.

FLOW DIAGRAM FOR REVIEW OF A WRAMC
RADIOACTIVE MATERIALS AUTHORIZATION APPLICATION



TITLE	MEMBER/SIGNATURE
DEPUTY COMMANDER (Chairperson) (576-1394/95)	WAUGH, David E., COL, MC
CHIEF, DEPARTMENT OF MEDICINE (Member) (576-1205	EARLL, Jerry M., COL, MC
CHIEF, DEPTMENT OF NURSING (Member) (576-1871)	KENESON, Lorene F., COL, ANC
CHIEF, DEPARTMENT OF PATHOLOGY (Member) (576-1280)	ZUCK, Thomas F., COL, MC
CHIEF, DEPARTMENT OF RADIOLOGY (Member) (576-1930)	BRAHMAN, Sherry L., LTC, MC
CHIEF, PREVENTIVE MEDICINE ACTIVITY (Member) (576-3962)	SAMPLE, Donald W., COL, MC
CHIEF, RADIATION THERAPY SERVICE (Member) (576-3575)	NEGLIA, William J., MAJ, MC
CHIEF, NUCLEAR MEDICINE SERVICE (Member) (576-1186)	KAMINSKI, Robert J., LTC, MC
CHIEF, BIOMEDICAL ENGINEERING (Member) (576-1261/3713	THURMAN, Harry, DAC
HEALTH PHYSICS OFFICER (Member) (427-5161)	QUILLIN, Robert M., LTC, MSC
CLINICAL RADIOLOGICAL PHYSICIST (Member) (5763575)	GOLDEN, Robert, DAC
SENIOR NUCLEAR PHARMACIST (Member) (576-1186)	CORLEY, James H., CPT, MSC
ASSISTANT HEALTH PHYSICS OFFICER (Alternate RPO) (Recorder) (427-5104)	STEVENSON, Dennis A., CPT, MSC
DIRECTOR, DIRECTORATE OF INDUSTRIAL OPERATIONS (Non-Voting Member) (576-3426)	CRAWFORD, John C., COL, MSC
CENTER JUDGE ADVOCATE (Non-Voting Member) (576-2531)	BOSWORTH, Michael J., DAC
DIRECTOR, WRAIR (Member) (576-1761)	TOP, Franklin Henry Jr., COL, MC
RADIATION SAFETY OFFICER, WRAIR (Member) (576-3428)	BASS, Billy G., DAC
CHAIRPERSON, AFIP RADIOISOTOPE COMMITTEE (Member) (576-2224)	GIBSON, Dean W., DAC 00641
RADIATION PROTECTION OFFICER, AFIP (Member) (576-2973)	HARTMAN, David S., LCDR, USNR
SCIENTIFIC ADVISOR, USAMRIID (393-1839 x2772)	BEISEL, William R., DAC

CURRICULUM VITAE

FOR

DAVID E. WAUGH, MD

PERSONAL DATA:

Born:

Parents:

Marriage:

Children:

Social Security No:

Religion:

Date of Rank: 4 January 1971

EDUCATIONAL BACKGROUND:

Undergraduate School: University of Dayton; Degree & Date: B.S.

Medical School: Ohio State University: Degree & Date: M.D.

INTERNSHIP: Rotating, St Elizabeth's Hospital, Dayton, Ohio 1961-1965

RESIDENCY IN GENERAL SURGERY: Brooke General Hospital, Ft Sam Houston, Texas 1961-1965

BOARD CERTIFICATION: American Board of Surgery 1967

MILITARY SCHOOL: Army Medical Service Career Course, Jul-Dec 1960
Received Skinner Medal

ASSIGNMENTS:

Commissioned as an Officer in the U.S. Army 9 June 1951

Entered Active Duty September 1956

Ex. 6

CURRICULUM VITAE .OR DAVID E. WAUGH, M.D.

ASSIGNMENTS (Cont'd)

Armed Forces Examining Station, Des Moines, Iowa 1956-1960

Post Dispensary, Ft Sam Houston, Texas April-June 1960

Medical Field Service School, Ft Sam Houston, Texas July-December 1960

24th Evacuation Hospital, Ft Sam Houston, Texas January-August 1961

Brooke General Hospital, Ft Sam Houston, Texas September 1961 to August 1965

Chief of General Surgery and Department of Surgery, 121st Evacuation Hospital, Korea 1965-1966

Assistant Chief, General Surgery Service, Tripler General Hospital Honolulu, Hawaii 1966-1969

Chief, Department of Surgery, Martin Army Hospital, Fort Benning, Georgia 1969-1974. Surgical Consultant, Third Army 1969-1972

Chief, Department of Surgery, Tripler Army Medical Center, Honolulu, Hawaii 1973-1977

Surgical Consultant to Chief Surgeon, HQ, USARPAC, July 1973-1976

Chief, Department of Surgery, Walter Reed Army Medical Center 1977 to March 1978

Deputy Commander, Walter Reed Army Medical Center March 1978 to present

ACADEMIC APPOINTMENTS:

Associate Clinical Professor in Surgery, Emory University, 1 June 1972 to 30 May 1973

Adjunct Professor in Clinical Pharmacy, School of Pharmacy, University of the Pacific, Stockton, California, 1 Jan 74 to 1977

Clinical Associate Professor of Surgery, University of Hawaii Medical School, July 1973 to 1977

PROFESSIONAL SOCIETY MEMBERSHIPS:

Fellow, American College of Surgeons

Association United States Army

Association of Military Surgeons

CURRICULUM VITAE FOR DAVID E. WAUGH, M.D.

PUBLICATIONS:

1. WAUGH, D.E.: Clinical Evaluation of 396 Patients with Adenocarcinoma of the Colon and Rectum. Mil Med, 132: 354-359, May 1967.

2. SCHAEFER, C.E., and WAUGH, D.E.: Mesentericoparietal Hernias: Reiteration of the Term and Classification of Intra-Abdominal Hernias. Am J Surg, 116: 847-852, December 1968.

3. WAUGH, D.E.: A New Technique for Gastrotomy. Surgery, 70: 368-369, September 1971.

4. WALTA, D.C.; GIDDENS, J.D.; JOHNSON, L.F.; KELLEY, J.L.; WAUGH, D.E.: Localized Proximal Esophagitis Secondary TO Ascorbic Acid Ingestion and Esophageal Motor Disorder. Gastroenterol. 70: 766-769, 1976.

PRESENTATIONS:

1. "The Emergency Room Nurse's Role in Multiple Trauma", presented at the 17th Annual Postgraduate Refresher Course on 20 August 1974, in Honolulu, sponsored by the University of California School of Medicine and the University of Hawaii School of Medicine.

2. "The Multiple Trauma Patient in the Emergency Room," presented at the annual meeting of the Hawaii Chapter, Association of Military Surgeons of the United States, 9 April 1975, Pearl Harbor, Hawaii.

3. "Complications of Burns", Pan Pacific Surgical Association Symposium on Trauma, 6 April 1977, Honolulu, Hawaii.

LORENE F. KENESON
COL, ANC
Chief, Department of Nursing

N O C U R R I C U L U M V I T A E A V A I L A B L E

CURRICULUM VITAE

NAME IN FULL: JERRY M. EARLL

RANK, CORPS, COMPONENT: COL, MC, USA

SSN:

DOB: PLACE OF BIRTH:

DATE ENTERED ACTIVE DUTY: Dec 1950 - Dec 1953
Jun 1958 - Present

DATE PRESENT RANK: 17 June 1972

TOTAL YEARS MILITARY SERVICE: 21 yrs.

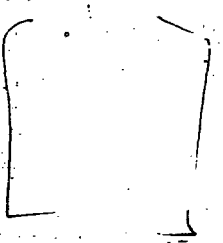
DATE PERMANENT RANK: 1976

WIFE'S NAME:

CHILDREN'S NAME(S) AND AGES:

EDUCATION - (MILITARY, CIVILIAN, DATE, DEGREE, SCHOOLS):

Wayne State Teachers College, Wayne, Nebraska
College of Pharmacy, University of Nebraska
Lincoln, Nebraska B.S. Pharmacy
College of Medicine, University of Iowa
Iowa City, Iowa M.D.



POSTGRADUATE:

1. Internship - Letterman General Hospital, S/F, CA 1958-1959
2. Residency, Internal Medicine, Letterman GH, S/F, CA 1959-1962
3. Military Medicine & Allied Science Course*, WRAIR, Wash., D.C. 1962-1963
4. Endocrinology Fellowship, Metabolic Research Unit 1965-1966
   University of California Medical Center, S/F, CA
   (Under direction of Dr. Peter H. Forsham)

MILITARY ASSIGNMENTS (IN ORDER, INCLUDE TITLE OF JOB):

ENLISTED:

1. Drafted 13 Dec 1950
2. Infantry Basic Training, Ft. Riley, KS
3. Medical Basic Training, BAMC, Ft. Sam Houston, TX
4. Leadership School, BAMC, Ft. Sam Houston, TX
5. Medical Aid Man, 1st Cav. Div., Korea, 1951

COMMISSIONED:

1. Assistant Battalion Surgeon, 179th Regiment, 45th Inf Div, Korea, 2LT, MSC 1951
2. Chief Administrative Officer, Medical-Surgical Service, Pharmacy Officer, USAH, Ft. Riley, KS 1952-1953
3. Discharged 16 Dec 1953
4. Back on active duty Jun 1958
5. Letterman GH, S/F, CA (Intern) 1958-1959
6. Resident, Letterman GH, S/F, CA 1959-1962

*Now named Research Fellowship

Ex 6

MILITARY ASSIGNMENTS: (Continued)

7.	Walter Reed Army Institute of Research, Wash., DC	1962-1963
8.	Chief, Endocrinology & Radioisotope Clinic, and Chief, General Medicine, William Beaumont GH, El Paso, TX	1963-1965
9.	Endocrinology Fellowship, Metabolic Research Unit, University of California, S/F, CA	1965-1966
10.	Chief, Endocrine-Nuclear Medicine Clinic and Chief, Research & Development Service, Tripler GH, Honolulu, HI	1966-1969
11.	Assistant Chief, Department of Endocrinology and Metabolism, Walter Reed Army Institute of Research, Wash., DC	1969-1970
12.	Chief, Endocrinology-Metabolism Service, WRGH, Wash., DC	1969-1976
13.	Chief, Department of Endocrinology & Metabolism, WRAIR, Wash., DC	1970-1976
14.	Army Liaison Officer with Endocrine Study Section of the National Institutes of Health	1972-1977
15.	Consultant in Endocrinology and Metabolism to The Surgeon General	1969-Present
16.	Chief, Department of Medicine, WRAMC, Wash., DC	1976-Present
17.	Professor of Medicine, Uniformed Services University of the Health Sciences	1976-Present
18.	Program Coordinator, Endocrine-Metabolic Service, Uniformed Services University of the Health Sciences.	1976-Present.
19.	Vice Chairman, Department of Medicine, Uniformed Services University of the Health Sciences	1977-Present

CIVILIAN FACULTY APPOINTMENTS:

Associate Professor of Medicine, University of Hawaii	1967-1969
Clinical Professor of Medicine, Georgetown University	1977-Present

MILITARY AWARDS, HONORS, BADGES:

U. S. Army Commendation Medal		1968
Awarded A prefix 3139	Dec	1973
U. S. Army Meritorious Service Medal		1976

CIVILIAN AWARDS AND HONORS:

Recipient, Borden Undergraduate Research Award in Medicine, State University of Iowa	1958
Diplomate - American Board of Internal Medicine	1965
Fellow, American College of Physicians	1967
Diplomate - American Board of Nuclear Medicine	1972
Diplomate - American Board of Endocrinology and Metabolism	1972

PROFESSIONAL SOCIETIES:

Fellow, American College of Physicians	1967
Endocrine Society	1966
American Diabetes Association	1965
American Society of Internal Medicine	1965
Nuclear Medicine Society	1965
International Society of Internal Medicine	1965
American Federation of Clinical Research	1964
Association of Military Surgeons	1960
New York Diabetes Association	1969

MISCELLANEOUS (INCLUDE HOBBIES, SPECIAL INTERESTS):

PUBLICATIONS (ATTACH SEPARATELY, GIVE COMPLETE CITATION):

See Attached List

BIBLIOGRAPHY

1. Earll JM, Russell L: Busulfan therapy of myelocytic leukemia during pregnancy. Am J Ob Gyn 92:580-581 (15 June) 1965.

2. Earll JM, Kurtzman NA, Moser RH: Hypercalcemia and hypertension. Ann Intern Med 64:378-381 (Feb) 1966.

3. Earll JM, McDonald HB: Severe thyrotoxicosis (Thyroid crisis). Southwest Med 46:332-335 (Dec) 1965.

4. Kolb FO, Earll JM, Harper HA: Disappearance of cystinuria in a patient treated with prolonged low methionine diet. Metabolism 16:378-381, 1967.

5. Earll JM, Spivey BE, Mattei IR: Atypical congenital monochromatism, a new pedigree of total color blindness with chromosomal studies. Arch Intern Med 118:491-493, 1966.

6. Earll JM, Kolb FO: Facial paralysis occurring with hypothyroidism - report of two cases. Calif Med 106:56-58, 1967.

7. Earll JM, Kolb FO: Therapy of cystinuria and cystine stone disease. Modern Treatment (Harper and Row) Vol 4 (May) 539-552, 1967.

8. Copinschi G, Hartog M, Earll JM, Havel RJ: Effect of various blood smapling procedures on serum levels of immunoreactive human growth hormone. Metabolism 16:402-409, 1967.

9. Hartog M, Havel RJ, Copinschi G, Earll JM, Ritchie BC: The relationship between changes in serum levels of growth hormone and mobilization of fat during exercise in man. Quart J Exp Physiology LII:86-96, 1967.

10. Smilo RP, Earll JM, Forsham PH: Suppression of tumorous adrenal hyperfunction by aminoglutethimide. Metabolism 16:374-377, 1967.

11. Cooper JD, Maldonado L, Earll JM: Adrenocortical carcinoma with virilism in an infant under one year of age. Am J Dis Children 113:730-732, 1967.

12. Adams JE, Seymore RJ, Earll JM, Tuck M, Sparks LL, Forsham PH: Transsphenoidal cryohypophysectomy in acromegaly, clinical and endocrinological evaluation. J Neurosurgery XXVIII (No 2):100-104 (Feb) 1968.

13. Earll JM, Sparks LL, Forsham PH: Glucose suppression of serum growth hormone in the diagnosis of acromegaly. JAMA 201:628-630, 1967.

14. Earll JM: Time for more physiologic management of diabetes. Mil Med 133:39-42, 1968.

15. DiRaimondo VC, Earll JM: Remarkable sensitivity to insulin in a patient with hypopituitarism and diabetic acidosis. Diabetes 17:147-151, 1968.

16. Glasser SP, Earll JM: Pituitary "Stone" - An unusual calcification. JAMA 203:367, 1968.

17. Earll JM, McCormack KR, Nusynowitz ML, Forsham PH: Thyroid function in active acromegaly. Mil Med 134 (No 1), January, 1969.

18. Earll JM, Newman S, DiRaimondo VC: Bilateral testicular tumors in untreated congenital adrenocortical hyperplasia. JAMA 209 (No 6): 937-938 (11 Aug) 1969.

19. Earll JM, Cohen AC, Lundbergh GR: Functioning parathyroid cyst. Am J Surg 118:100-103 (Jul) 1969.

20. Davia JE, Earll JM, Moore RE, Durden WC: Rose Bengal liver and abdominal scans in the differential diagnosis of jaundice. Mil Med 134 (No 6), June, 1969.

21. Low JC, Earll JM: Calcium in toothpaste. N Engl J Med 283:765, 1970.

22. Heath H, Earll JM, Schaaf M, Piechocki JT, Li TK: Serum ionized calcium during bedrest in fracture patients and normal men. Metabolism 21 (No 7):633-640, 1972.

23. Wartofsky L, Earll JM, Martin D: Alterations in thyroid iodine release and the peripheral metabolism of thyroxine during acute falciparum malaria in man. J Clin Invest 41:2215-2232, 1972.

24. Wartofsky L, Martin D, Earll JM: Non-thyroxine iodine release from the thyroid during acute malaria. J Clin Endocrinol Metab 35:624-626, 1972.

25. Low JC, Schaaf M, Earll JM, Piechocki J, Li TK: Ionic calcium determination in primary hyperparathyroidism. JAMA 223:152-155 (Jan) 1973.

26. Dimond RC, Brammer SR, Howard WJ, Atkinson RL, Earll JM: Chlorpromazine treatment and growth hormone secretory responses in acromegaly. J Endocrinol Metab 34:1189-1195 (June) 1973.

27. Noel G, Dimond, RC, Wartofsky L, Earll JM, Frantz AG: Studies of prolactin and TSH secretion by continuous infusion of small amounts of thyrotropin-releasing hormone (TRH). J Clin Endocrinol Metab 39:6-17, 1974.

28. Atkinson RL, Dimond RC, Howard WJ, Earll JM: Unsuccessful treatment of acromegaly with medroxyprogesterone acetate. ACTA Endocrinologica 77:19-25, 1974.

29. Burman KD, Earll JM, Johnson MC, Wartofsky L: Clinical observation on the solitary autonomous thyroid nodule. Arch Intern Med 134:915-919, 1974.

30. Heath H, Colwell NR, Ammerman S, Earll JM: Measurement of Achilles reflex time with a new instrument and quantification of factors causing variation. Mil Med 139:547-549, 1974.

31. Atkinson RL, Earll JM: Munchausen's syndrome with renal stones. JAMA 230:89, 1974.

32. Burman KD, Yeager HC, Briggs WA, Earll JM, Wartofsky L: Resin hemoperfusion: New treatment for thyroid storm. Excerpta Medica 378:437-440, 1975.

33. Atkinson RL, Becker DC, Martins A, Schaaf M, Dimond RC, Wartosfky L, Earll JM: Treatment of Acromegaly by transsphenoidal microsurgery. JAMA 233:1279-1283, 1975.

34. Monchik JM, Doppman JL, Earll JM, Aurbach, GD: Localization of hyperfunctioning parathyroid tissue (Radioimmunoassay of parathyroid hormone on samples from the large veins of the neck and thorax and selectively catheterized thyroid veins). Am J Surg 129:413-420, 1975.

35. Burman KD, Wright FD, Earll JM, Wartofsky L: Evaluation of a rapid and simple technique for the radioimmunoassay of triiodothyronine (T_3). J Nuc Med 16:662-665, 1975.

36. Burman KD, Dimond RC, Noel GN, Earll JM, Frantz AG, Wartofsky L: Klinefelters' syndrome: Examination of thyroid function and the TSH and PRL responses to thyrotropin releasing hormone prior to and after testosterone administration. J Clin Endocrinol Metab 41:1161-1166, 1975.

37. Burman KD, Yeager HC, Briggs WA, Earll JM, Wartofsky L: Resin hemoperfusion: A potential new treatment for thyroid storm. J Clin Endocrinol Metab 42:70-78, 1976.

38. Wartofsky L, Dimond RC, Noel GL, Earll JM: Estimates of pituitary stores of TSH and PRL in normal subjects and patients with primary hypothyroidism by the use of continuous TRH infusion. Excerpta Medica ("Advances in thyroid research - 1975") 378:11-14, 1976.

39. Wartofsky L, Dimond RC, Noel GL, Frantz AG, Earll JM: Effect of acute increases in serum triiodothyronine on TSH and prolactin responses to TRH and estimates of pituitary stores of TSH and prolactin in normal subjects and patients with primary hypothyroidism. J Clin Endocrinol Metab 42:443-458, 1976.

40. Earll JM, Gaunt K, Earll LA, Djuh YY: Effect of ethyl alcohol on ionic calcium and prolactin in man. Aviat Space Environ Med 47:808-810, 1976.

41. Noel GL, Dimond RC, Earll JM, Frantz AG: Prolactin, thyrotropin and growth hormone release during stress associated with parachute jumping. Aviat Space Environ Med 47:543-547, 1976.

42. Burman KD, Read J, Dimond RC, Strum D, Wright FD, Patow W, Earll JM, Wartofsky L: Measurements of 3, 3', 5'-Triiodothyronine (Reverse T3), 3, 3'-Diiodothyronine, T3, and T4 in human amniotic fluid and in cord and maternal serum. J Clin Endocrinol Metab 43:1351-1359, 1976.

43. Burman KD, Monchik JM, Earll JM, Wartofsky L: Ionized and total serum calcium and parathyroid hormone in hyperthyroidism. Ann Intern Med 84:668-671, 1976.

44. Burman KD, Dimond RC, Earll JM, Wright FD, Wartofsky L: Sensitivity to lithium in treated Graves' Disease: Effects on serum T4, T3 and reverse T3. J Clin Endocrinol Metab 43:564-571, 1976.

45. Burman KD, Dimond RC, Wright FD, Earll JM, Bruton J, Wartofsky L: A radioimmunoassay for 3, 3', 5'-L-Triiodothyronine (Reverse T3): Assessment of thyroid gland content and serum measurements in conditions of normal and altered thyroidal economy and following administration of TRH and TSH. J Clin Endocrinol Metab 44:660-672, 1977.

46. Wartofsky L, Burman KD, Dimond RC, Noel GL, Frantz AG, Earll JM: Studies on the nature of thyroidal suppression during acute falciparum malaria. Integrity of pituitary response to TRH and alterations in serum T3 and reverse T3. J Clin Endocrinol Metab 44:85-90, 1977.

47. Burman KD, Strum D, Dimond RC, Djuh YY, Wright FD, Earll JM, Wartofsky L: A radioimmunoassay for 3, 3'-L-Diiodothyronine (3, 3'T2). J Clin Endocrinol Metab (Aug) 1977.

48. Monchik JM, Wray HL, Schaaf M, Earll JM: Nonautonomy of parathyroid hormone and urinary cyclic AMP in primary hyperparathyroidism. Am J Surg 133:498-505, 1977.

49. Corrigan DF, Sc af M, Whaley RA, Czerwinsky CL arll JM: Selective venous sampling to differentiate ectopic ACTH secretion from pituitary Cushing's syndrome. N Engl J Med 296:861-862 (Apr) 1977.

50. Thompson P, Earll JM, Schaaf M: Comparison of clofibrate and chlorpropamide in vasopressin-responsive diabetes insipidus. Metabolism 26:749-762, 1977.

51. Corrigan DF, Wartofsky L, Dimond RC, Schaaf M, Earll JM, Rogers JE, Wright FD, Burman KD: Parameters of thyroid function in patients with active acromegaly. Metabolism 27:209-216, 1978.

ABSTRACTS

1. Smilo RP, Earll JM, Fariss BL, Forsham PH: Suppression of tumorous adrenal hyperfunction by aminoglutethimide. Clin Res XV:127, 1967.

2. Earll JM, Tuck MD, Sparks LL, Seymore RH, Adams JE, Forsham PH: Endocrine studies in acromegaly before and after cryohypophysectomy. Clin REs XV:123, 1967.

3. Earll JM, Copinschi G, Hartog M, Havel RJ: Serum insulin during prolonged muscular exercise in man. Clin Res XV:109, 1967.

4. Earll JM, McCormack KR, Nusynowitz ML: Thyroid function in patients with active acromegaly. J Clin Res XV:97, 1967.

5. Sparks LL, Earll JM, McMillan DE, Tuck MD, Forsham PH: Critical factors in the diagnosis of active acromegaly, 48th Annaul Session American College of Physicians, 13 April 1967, San Francisco, page 78.

6. Davia JE, Earll JM, Moore RD: Serial ^{131}I rose bengal liver and abdominal scans in the differential diagnosis of jaundice. Clin Res XVI:116, 1968.

7. Earll JM, Heath H, Schaaf M, Wray HL, Monchik J: Metabolic changes occurring with bedrest, their significance and therapy. Proceedings of the XIX International Congress of Aviation and Space Medicine, page 73, 1971.

8. Wartofsky L, Martin D, Graham BS, Earll JM: Thyroid function in malaria. Clin Res 19:384, 1971.

9. Heath H, Earll JM, Schaaf M, Piechocki JT, Li TK, Baker GI: Abnormal serum ionized calcium with immobilization and bedrest. Clin Res 19:477, 1971.

10. Low JC, Schaaf M, Earll JM, Piechocki JT, Li TK: The value of serum ionized calcium in the diagnosis of normocalcemic and hypercalcemic primary hyperparathyroidism. Clin Res 19:375, 1971.

11. Atkinson RL, Howard WJ, Dimond RC, Moorhead JM, Earll JM: Treatment of acromegaly with medroxyprogesterone. Clin Res XIX (No 3):649, 1971.

12. Dimond RC, Brammer SR, Howard WJ, Atkinson RL, Earll JM: Chlorpromazine treatment of acromegaly. Clin Res XX:424 (Apr) 1972.

13. Low JC, Djuh YY, McNeil JS, Earll JM: Relationships of serum lactate and pH to serum ionic calcium. Presented at the XXth International Congress of Aviation and Space Medicine, Nice, France, Sept, 1972.

14. Low JC, Djuh YY, McNeil JS, Earll JM: The effect of sodium L (+) lactate infusion on serum ionic calcium. Clin Res XXI:69 (Jan), 1973.

15. Atkinson RL, Becker DP, Martins AM, Earll JM: Transsphenoidal microsurgery in the treatment of acromegaly. 54th Annual Session American College of Physicians, 1973.

16. Wray HL, Atkinson RL, Low JC, Schaaf M, Earll JM: Evidence for rapid suppressibility of biologically active parathyroid hormone in diseases of calcium metabolism. Clin Res XXI:48 (Jan) 1973.

17. Atkinson RL, Becker DP, Earll JM: Successful treatment of acromegaly by transsphenoidal microsurgery. Clin Res 21:249 (Feb) 1973.

18. Wray HL, Atkinson RL, Low JC, Schaaf M, Earll JM: Evidence for non-autonomy of biologically active parathyroid hormone in diseases of calcium metabolism. Clin Res 21:69 (Jan) 1973.

19. Wartofsky L, Dimond RC, Noel GL, Adler RA, Earll JM: Failure of T3 to block TSH responses to TRH in normal subjects and patients with primary hypothyroidism. Program 59th Management American Thyroid Association. Endocrinology 93:T2, 1974.

20. Burman KD, Dimond RC, McGuire RA, Earll JM, Strum D, Wartofsky L: The effect of varying serum T4 concentrations on extrathyroid production of T3, reverse T3 and 3-3' Diiodothyronine. Clin Res 24:270, 1976.

CURRICULUM VITAE
30 November 1978

NAME:	Thomas F. Zuck, M.D. COL, MC
PRESENT POSITION:	Chief, Department of Pathology Walter Reed Army Medical Center Washington, D.C. 20012
EDUCATION:	
COLLEGE	Carleton College Northfield, Minnesota 1951-1955 (B.A.
MEDICAL	Hahnemann Medical College Philadelphia, Pennsylvania 1959-1963 (M.D.
OTHER	Yale Law School New Haven, Connecticut 1955-1958 (L.L.B.
INTERNSHIP:	Tripler U.S. Army Hospital Honolulu, Hawaii 1963-1964 (Rotating)
RESIDENCY:	Fitzsimons Army Medical Center Denver, Colorado 1964-1968 (Pathology) Chief Resident, 1967-1968
CERTIFICATION:	Diplomate, National Board of Examiners, 1964 Diplomate, American Board of Pathology, 1969 (Anatomical and Clinical)
LICENSURE:	Medicine - Ohio (#031465) Law - Ohio
MEMBERSHIP:	American Medical Association American Association of Blood Banks American Society of Hematology American Bar Association Association of Military Surgeons of the U.S.

 Ex. 6

Curriculum Vitae
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APPOINTMENTS:

Chief, Department of Surgery
Letterman Army Institute of Research
Presidio of San Francisco, CA 94129
1974-1977

Assistant Chief, Department of Pathology
Fitzsimons Army Medical Center
Denver, Colorado
1972-1974

Medical Director of the Blood Bank and
Staff Pathologist, Department of Pathology
Fitzsimons Army Medical Center
Denver, Colorado
1968-1972

Inspection and Accreditation Inspector
American Association of Blood Banks
1971 to date

Committee on Autologous Transfusion
American Association of Blood Banks
1972 to date
Chairman 1973-1974, 1974-1975

Assistant Clinical Professor, Pathology
University of Colorado Medical School
1 July 1974 to 1 July 1976

Committee on Ethics
American Association of Blood Banks
1974-1975

Committee on Standards
American Association of Blood Banks
1974 to date

Committee on Scientific Program
American Association of Blood Banks
1974 to date
Chairman, 1976, 1977

APPOINTMENTS (Cont):

Scientific Advisory Committee
American Association of Blood Banks
1974-1976

Consulting Pathologist
Letterman Army Medical Center
1975-1977

Board of Contributors, Book Reviews
and Abstracts, Transfusion
1974 to date

Work-Group Member, Advisory Committee
Blood Diseases and Blood Resources, NHLI
May, 1975

Member, Organizing Committee
Scientific Section, American Association of
Blood Banks
1975 to date

Secretary, American Association of
Blood Banks
1977-1978

Associate Editor, Transfusion
1977

President-Elect
American Association of Blood
Banks, 1978-1979

Curriculum Vitae
Thomas F. Zuck, M.D.

HONORS:

Hugh Mahon Award for Outstanding Research Paper, Fitzsimons Army Medical Center
1966

Visiting Professor
University of Utah Medical Center
April 1972

Visiting Professor
Walter Reed Army Medical Center
May 1974

Meritorious Service Medal (U.S. Army)
1974

Visiting Professor
University of Utah Medical Center
March 1975

Visiting Professor
University of Maryland Hospital
March 1975

Visiting Professor
Tripler U.S. Army Medical Center
Honolulu, Hawaii
February 1976

American Men and Women of Science
1976

Certificate of Outstanding Achievement
U.S. Army 1976 Science Conference

Who's Who in the West
1977

South Central Association of Blood Banks
Annual Lecture Award
February 1978

Department of the Army Research and Development Award
1978

"A" Professional Designator Award
Department of the Army, 1978

Curriculum Vitae
Thomas F. Zuck, M.D.

PUBLICATIONS:

1. Zuck, T.F., Bergin, J.J.: The heparin exchange phenomenon. Lancet 1:210, 1970 (Letter).

2. Zuck, T.F., Head, D.R.: Blood transfusion in the presence of hemolytic anemia. Lancet 11:382, 1971 (Letter).

3. Eller, J.L., Ziter, F.M., Zuck, T.F., Brott, W.: Inflammatory polyp: A complication of esophagus line by columnar epithelium. Radiology 98:145, 1971.

4. Zuck, T.F., Bergin, J.J., Raymond, J.M.: Implications of depressed antithrombin-III associated with oral contraceptives. Surg. Gynec. & Obstet. 133:209, 1971.

5. Zuck, T.F., Bergin, J.J., Raymond, J.M., et al: Platelet adhesiveness in symptomatic women taking oral contraceptives. Thromb. Diath. Hemorr. 26:426, 1971.

6. Zuck, T.F., Raymond, J.M., Dwyre, W.R.: A rapid simplified prothrombin assay. Amer. J. Clin. Path. 57:352, 1972.

7. Zuck, T.F., Bergin, J.J.: Thrombotic predisposition associated with oral contraceptives. Obstet. & Gynec. 41:427, 1973.

8. Zuck, T.F., Bergin, J.J., Perkins, R.P.: Antithrombin-III activity and oestrogen content of oral contraceptives. Lancet 1:831, 1973 (Letter).

9. Bergin, J.J., Zuck, T.F., Miller, R.E.: Compelling splenectomy in medically compromised patients. Ann. Surg. 178:761, 1973.

10. AABB Technical Manual, Miller, W. (ed.), Autologous Transfusion, 1974.

11. Bergin, J.J., Zuck, T.F.: Selected aspects of component therapy. Dawson, R.B. (ed.), AABB, Washington, 1974, p 1.

12. Zuck, T.F., Bergin, J.J.: Laboratory interface with transfusion therapy. Ibid, p 15.

PUBLICATIONS (cont)

13. Zuck, T.F., Bensinger, T.A.: Implications of sterile docking devices. Transfusion 15:399, 1975.

14. Zuck, T.F.: Soluble procoagulant therapy. Workshop Manual of Component Therapy, ASCP, 1975.

15. Zuck, T.F. (ed.): Human Hemostasis. Chicago, AABB, 1975.

16. Zuck, T.F.: Autologous transfusion: Advantages and uses. Technical Improvement Services, ASCP, 43:26, 1976.

17. Zuck, T.F. (contributor): General Principles of Blood Transfusion. Greenwalt, T.J., (ed.), 1977.

18. Bensinger, T.A., Zuck, T.F.: Additional Studies concerning the metabolism of packed erythrocytes in CPD-adenine. Transfusion 16:353, 1976.

19. Collins, G.J., Zuck, T.F., Zajtchuk, R., Heyman, R.L.: Hypercoagulability in mesenteric venous occlusion. Am. J. Surg. 132(3):390-391, 1976.

20. Zuck, T.F.: Donor response to predeposit autologous transfusion phlebotomy. In, Autologous Transfusion. Dawson, R.B. (ed.), AABB, Washington, DC, 1976.

21. Corby, D.G., Zuck, T.F.: Newborn platelet dysfunction: A storage pool and release defect. Thrombos. Haemastas. 36:200-207, 1976.

22. DeVenuto, F., Zuck, T.F., Zegna, A.I., Moores, W.Y.: Characteristics of stroma-free hemoglobin prepared by crystallization. J. Lab. Clin. Med. 89:509, 1977.

23. Zuck, T.F., Bensinger, T.A., Peck, C.C., Chillar, R.K., Beutler, E., Button, L.N., McCurdy, P.R., Josephson, A.M., Greenwalt, T.J.: The in vivo survival of red blood cells stored in modified CPD with adenine: Report of a multi-institutional cooperative effort. Transfusion 17:374-382, 1977.

24. DeVenuto, F., Moores, W.Y., Zegna, A.I., Zuck, T.F.: Total and partial blood exchange in the rat with hemoglobin prepared by crystallization. Transfusion, 17:555,1977.

PUBLICATION (cont)

25. Friedman, H.I., DeVenuto, F., Zuck, T.F., Moores, W.Y., Odom, S.K.: The histological and ultrastructural effects of stroma-free hemoglobin solutions on liver, kidney, and brain. Surgical Forum, 28:3-5,1977.

26. Zuck, T.F., DeVenuto, F., Neville, J.R., Friedman, H.I.: Oncotic and oxygen transport effects of hemoglobin solutions. Presented at the 9th Annual Red Cross Scientific Symposium, May 1977, in press.

27. Zuck, T.F.: In vivo performance evaluation of blood bank components. In, A Seminar on Blood Bank Components, American Association of Blood Banks. Myhre, B.A., (ed.), AABB, Washington, DC, 1977.

28. Peck, C.C., Zuck, T.F.: International Forum: What is the toxicologic importance of the liberation of the phthalates from plastic containers into blood, its components and derivatves? Vox Sang., 34:4,244-54, 1978.

29. Bensinger, T.A., Zuck, T.F., Tolbert, B., McLaughlin, S., Aguirre, K., Peck, C.C., and Knight, M.: An Enzymatic Method for Measurement of Ascorbate-2-Phosphate. Biochem. Med., 19, 118-126, 1978.

30. Friedman, H.I., DeVenuto, F., Lollini, L., Mellick, P., Zuck, T.F.: Morphologic Effects Following Massive Exchange Transfusions with a Stroma-Free Hemoglobin Solution. Laboratory Investigation, 39:2,167-177, 1978.

31. Dawson, R.B., Levine, Z., Zuck, T., Hershey, R.T., and Myers, C.: Blood Preservation XXVII. Fructose and Mannose Maintain ATP and 2,3-DPG. Transfusion, 18:3,347-352, 1978.

Curriculum Vitae
Thomas F. Zuck, M.D.

PRESENTATIONS (International and National)

1. Zuck, T.F.: Rates of generation and progressive neutrilization of thrombin in symptomatic women taking oral contraceptives. II, Congress, International Society on Thrombosis and Haemostasis, Oslo. Abstracts, p. 106, 1971.

2. Zuck, T.F., Bergin, J.J.: Continuous platelet infusions in immune thrombocytopenia. 24th Annual Meeting, American Association of Blood Banks, Chicago. Abstracts, p. 94, 1971.

3. Zuck, T.F., Dwyre, W.R.: Evaluation of concomitant double plateletpheresis. 24th Annual Meeting, American Association of Blood Banks, Chicago. Abstracts, p. 94, 1971.

4. Zuck, T.F., Bergin, J.J.: Shifts in thrombin kinetics induced by conjugated equine estrogens. III Congress, International Society on Thrombosis and Haemostasis, Washington. Abstracts, p. 160, 1972.

5. Corby, D.G., Shigeta, F.H., Zuck, T.F.: Speculations on the implications of newborn platelet defects. III Congress, International Society on Thrombosis and Haemostasis, Washington. Abstracts, p. 180, 1972.

6. Zuck, T.F., Bergin, J.J.: Adequacy of oral iron to support erythropoiesis during intensive phlebotomy for autologous transfusion. XIII International Transfusion Congress, Washington. Abstracts, p. 49, 1972.

7. Buscher, J.F., Zuck, T.F.: Effects of intravenous anti-Rho immune globin. XIII International Transfusion Congress, Washington. Abstracts, p. 65, 1972.

8. Zuck, T.F.: Coagulation testing. Annual Meeting, Society of American Medical Technologists. Denver, 1970 (by invitation).

9. Bergin, J.J., Zuck, T.F., Corby, D.G., Shigeta, F.H.: Effect of childbirth on maternal and fetal antithrombin-III activity. IV Congress, International Society on Thrombosis and Haemostasis, Vienna. Abstracts, p. 496, 1973.

10. Zuck, T.F., Bergin, J.J., Perkins, R.P., Barber, J.A., Shigeta, F.H.: On the mechanism of antithrombin-III depression in women using oral contraceptives. IV Congress, International Society Thrombosis and Haemostasis, Vienna. Abstracts, p. 223, 1973.

PRESENTATION (International and National) (cont)

11. Corby, D.G., Preston, K.A., Shigeta, F.H., Obar, T.P., Zuck, T.F.: Adverse effects of gel filtration on the adenine nucleotides of human platelets. IV Congress, International Society on Thrombosis and Haemostasis, Vienna. Abstracts, p. 107, 1973.

12. Zuck, T.F., Heyman, R.R., Collins, J.R.: Hypercoagulability in the surgical patient. Annual Meeting, American Medical Association, New York. Abstracts, p. 93, 1973.

13. Zuck, T.F., Brown, G.L., Buck, L.L.: Effects of in vitro irradiation on platelet function and lymphocyte viability. Annual Meeting, American Association of Blood Banks, Bal Harbour. Abstract, Transfusion 13:344, 1973.

14. Zuck, T.F.: Multiple closed system single-donor phlebotomies for neonatal replacement transfusions. Annual Meeting, American Association of Blood Banks, Bal Harbour. Abstract, Transfusion 13:366, 1973.

15. Zuck, T.F., Polesky, H.F., Britt, C., Barber, J.A.: Relationship between high platelet counts and low pH of room temperature stored platelet concentrates. Annual Meeting, American Association of Blood Banks, Anaheim. Abstract, Transfusion 14:513, 1974.

16. Zuck, T.F., Ballard, A., Mayfield, G.W., Barber, J.A.: Thrombosis discrimination studies following lower extremity prosthetic surgery. National Conference on Thrombosis and Hemostasis, Dallas. Abstract, Circulation Suppl III, 49 and 50: III 299, 1974.

17. Zuck, T.F., Buscher, J.R.: A distinctive form of platelet consumption in newborn infants. Ibid, p. III-303.

18. Peck, C.C., Bailey, F.J., Moore, G.L., Zuck, T.F.: Urinary supersaturation of 2,8 dihydroxyadenine (DOA). Annual Meeting, American Association of Blood Banks, Chicago. Abstract, Transfusion 15:518, 1975.

19. DeVenuto, F., Moores, W.Y., Zegna, A.I., Zuck, T.F.: Characteristics of stroma-free hemoglobin prepared by crystallization. Annual Meeting, American Association of Blood Banks, Chicago. Abstract, Transfusion 15:525, 1975.

PRESENTATIONS (International and National) (cont)

20. Zuck, T.F., Bensinger, T.A.: Beneficial effects on red cell ATP of delayed addition of glucose and adenine. Annual Meeting, American Association of Blood Banks, Chicago. Abstract, Transfusion 15:517, 1975.

21. Bensinger, T.A., Zuck, T.F.: Trisodium ascorbate phosphate, a stabilized form of ascorbic acid, promotes 2,3 diphosphoglycerate maintenance during blood storage. Annual Meeting, American Association of Blood Banks, San Francisco. Abstract, Transfusion 16:518, 1976.

22. Neville, J.R., Bensinger, T.A., Zuck, T.F.: Effect of temperature on blood storage. Annual Meeting, American Association of Blood Banks, San Francisco. Abstract, Transfusion 16:517, 1976.

23. DeVenuto, F., Zuck, T.F., Moores, W.Y., Zegna, A.I.: Blood exchange in the rat with hemoglobin prepared by crystallization. Annual Meeting, American Association of Blood Banks, San Francisco. Abstract, Transfusion 16:526-527, 1976.

24. Zuck, T.F., DeVenuto, F., Neville, J.R., Friedman, H.I.: Oncotic and oxygen transport effects of hemoglobin solutions. Presented at the 9th Annual Red Cross Scientific Symposium, Washington, DC, in press.

25. Course Director, A problem oriented workshop on component therapy, ASCP, Dallas, March, 1977.

26. Zuck, T.F.: An approach to the bleeding patient, presented at Advances in Immunohematology and Blood Transfusion, Minneapolis, March, 1977 (by invitation).

27. Zuck, T.F.: Extended red cell preservation, presented at Advances in Immunohematology and Blood Transfusion, Minneapolis, March, 1977 (by invitation).

Curriculum Vitae
Thomas F. Zuck, M.D.

PRESENTATIONS, Regional

1. Zuck, T.F.: Plateletpheresis tolerance in normal donors. Hugh Mahon Award paper, 1966.

2. Zuck, T.F., Bergin, J.J.: Splenectomy in patients with anti-platelet antibodies. Regional Meeting, American College of Physicians. Colorado Springs, 1969.

3. Bergin, J.J., Zuck, T.F.: Splenectomy in hematologically poor risk patients. Regional Meeting, American College of Physicians. Colorado Springs, 1969.

4. Bergin, J.J., Zuck, T.F.: The "pill," hypercoagulability, and testing. Regional Meeting, American College of Physicians. Colorado Springs, 1973.

5. Zuck, T.F., Bergin, J.J.: Oral iron in autologous transfusion programs. Regional Meeting, American College of Physicians. Colorado Springs, 1973.

6. Zuck, T.F.: Clinical and diagnostic aspects of coagulation testing. Annual Meeting, Minnesota Association of Blood Banks. Minneapolis, 1973. (By invitation)

7. Zuck, T.F.: Autologous transfusion. Annual Meeting, Minnesota Association of Blood Banks. Minneapolis, 1973. (By invitation)

8. Zuck, T.F.: Current concepts in coagulation testing. Current Concepts in Pathology. St. Louis, 1973.

9. Bergin, J.J., Zuck, T.F.: Thrombin generation index and antithrombin III as guides to anticoagulation in the surgical patient. American College of Physicians Regional Meeting. Colorado Springs, 1974.

10. Zuck, T.F.: Autologous transfusion: The ideal volunteer donor system? Tri-State Blood Bank Meeting. Dubuque, 1974 (by invitation).

11. Zuck, T.F.: The popularization of autologous transfusion. Annual Meeting, Michigan Association of Blood Banks. Detroit, 1974 (by invitation).

PRESENTATIONS, Regional (cont)

12. Bergin, J.J., Zuck, T.F.: Reversal of warfarin toxicity while maintaining therapeutic anticoagulation. American College of Physicians Regional Meeting. Colorado Springs, 1975.

13. Zuck, T.F.: Transfusion problems peculiar to the neonatal patient. Presented at 23rd Annual Meeting, California Blood Bank System, April 1975 (by invitation).

14. Zuck, T.F.: Transfusion "cocktails" for the bleeding patient. Medical Technologists Association. Sacramento, March 1975.

15. Zuck, T.F.: Liquid blood preservation, blood transfusion and banking. National Naval Medical Center, Washington, May 1975.

16. Zuck, T.F.: Seminar in problems in coagulation. Colorado Association for Continuing Education. Denver, October, 1975.

17. Zuck, T.F.: Recent advances in blood preservation. American College of Physicians, Internal Medicines and the Practice of Internal Medicine, January 1976.

18. Zuck, T.F.: Update in coagulation. Pacific Northwest Society of Pathologists Fall Meeting. Sun Valley, September 1976 (by invitation).

19. Zuck, T.F.: Storate of red cells, ibid.

20. Zuck, T.F.: CPD-Adenine. Washington- Baltimore Blood Study Group, September, 1977 (by invitation).

21. Zuck, T.F.: Current Trends in Coagulation Testing: The Contact Phase. The Society of Armed Forces Medical Laboratory Scientists. Williamsburg, October 1977 (by invitation).

22. Course co-director, A problem oriented workshop on component therapy, ASCP, Tucson, January, 1977.

23. ZUCK, T.F.: Current Status of CPD Adenine. South Central Association of Blood Banks Annual Lectureship Award, Jackson, February, 1978.

Curriculum Vitae
Thomas F. Zuck, M.D.

REGIONAL PARTICIPATIONS:

Colorado Antibody Society Blood Banking Symposium, panel member, 1968.

Component Therapy of the Bleeding Patient, Seminar, Colorado Society of Clinical Pathologists, moderator, 1969.

Post Graduate Education Seminar. Colorado Society of Clinical Pathologists. Techniques of blood component preparation and administration. 1968.

Post Graduate Conference of Nurse Anesthetists. Rocky Mountain Region, 1969.

Colorado Antibody Society Symposium, moderator, 1969.

Post Graduate Education Seminar, Colorado Society of Clinical Pathologists. Fundamentals of coagulation testing, 1970.

Colorado Antibody Society Symposium, moderator, 1970.

Post Graduate Education Seminar, Colorado Society of Clinical Pathologists. Rapid diagnosis of disseminated intravascular coagulation, 1971.

Post Graduate Education Seminar, Colorado Society of Clinical Pathologists. Rapid evaluation of the bleeding patient, 1972.

Colorado Antibody Society, Vail Symposium, moderator, 1972.

Post Graduate Education Seminar, Colorado Society of Clinical Pathologists. Clinical correlations with laboratory coagulation testing systems, 1973.

Colorado Antibody Society, Platelet Symposium, moderator, Steamboat Springs, Colorado, 1974.

Curriculum Vitae
Thomas F. Zuck, M.D.

PERSONAL:

BORN

WIFE

CHILDREN

NONMEDICAL ACTIVITIES:

HOBBY:

EXHIBITS

CURRENT ADDRESS:

Ex 6

CURRICULUM VITAE

SHERRY L. BRAHMAN, M.D.

Date and Place of Birth: [redacted]

EDUCATION:

High School
Wisconsin Academy

College
Andrews University
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B.A. Zoology

Medical School
Loma Linda University School of Medicine
Loma Linda, California
M.D.

Post Graduate:

Internship: 1970-1971
Rotating - Letterman Army Medical Center
Presidio, San Francisco

Residency: 1971-1974
Diagnostic Radiology - Letterman Army Medical Center, Presidio, San Francisco, California

Included:

a. 8 week Armed Forces Institute of Pathology Radiologic-pathology course

b. One month pediatric radiology with Dr. H. Taybi
Children's Hospital
Oakland, California

c. One month pediatric radiology
UCSF - Dr. C. Gooding

d. One month cardiac radiology
UCSF, Dr. E. Carlson

e. Two months neuroradiology
UCSF - Dr. H. Newton

f. Two weeks ultrasound
UC San Diego - Dr. B. Gosink and
San Diego Naval Hospital - Dr. M. Asher

Ex. 6

CURRICULUM VITAE - Sherry L. Brahman, M.D.

CERTIFICATION:

Diplomate, National Board of Medical Examiners	July 1971
Diplomate, Diagnostic Radiology Board American College of Radiology	December 1974

MEDICAL LICENSURE:

No. G - 23933	California	1970
No. F - 4768	Texas	1979

PROFESSIONAL ASSIGNMENTS:

Teaching Staff, Diagnostic Radiology Letterman Army Medical Center Presidio, San Francisco	1974 - 1975
Diagnostic Radiology Staff 2nd General Army Hospital Landstuhl, Germany	1975 - 1976
Chief, Department of Radiology 2nd General Hospital Landstuhl, Germany (This is the referral hospital for the European Theater.)	1976 - 1978
Consultant in Radiology to Commanding General US Army Medical Command, Europe	1977 - 1978
Chief, Angiography and Ultrasound Brooke Army Medical Center San Antonio, Texas	1978 - 1979
Chief, Department of Radiology Walter Reed Army Medical Center Washington, D.C.	June 1979 - Present

PROFESSIONAL ORGANIZATIONS:

American College of Radiology

Radiological Society of North America

Bavarian-American Radiologic Society

San Antonio Radiologic Society

CURRICULUM VITAE - Sherry L. Brahman, M.D.

HONORS, AWARDS:

1. Ultrasound Training in San Diego was award for top senior resident.

2. Army Commendation Medal for work as Consultant and Chief of Radiology in Europe.

3. AMA - Physicians' Recognition Award in Continuing Medical Education.

LECTURESHIPS:

1. "Xeromammographic and Gross Pathologic Correlation of Breast Cancer" — April 1975
   Department of Surgery
   Letterman Army Medical Center

2. "Accuracy of Detecting Breast Cancer with Xeromammography" — September 1976
   Bavarian-American Radiologic Society (BARS)
   Garmisch, Germany

3. "Xeromammography - Benign and Malignant Lesions" for Radiology section — May 1977
   USAEUR Annual Medical-Surgical Conference
   Garmisch, Germany

4. "CT Scanners-How to Evaluate" — September 1977
   BARS
   Landstuhl, Germany

5. "Myelography-Old and New" — December 1977
   BARS
   Nurenberg, Germany

6. "Role of Radiology in Work-Up of Patients with Neurologic Complaints" — March 1978
   Physicians Extenders' Conference
   Landstuhl, Germany

7. "Computerized Tomography in Evaluating CP Angle Tumors" — April 1978
   USAEUR-ENT Quarterly Meeting
   Landstuhl, Germany

8. "Common Pitfalls in Chest Film Interpretation" — May 1978
   USAEUR Medical-Surgical Conference, Internal Medicine Section
   Garmisch, Germany

CURRICULUM VITAE - Sherry L. Brahman, M.D.

ORGANIZED AND HOSTED:

1. Bavarian-American Radiologic Society - 2 day conference at Landstuhl, Germany with Dr. Elias Theros as guest speaker. — September 1977

2. USAEUR Annual Medical-Surgical Conference (5 days) Garmisch, Germany, Radiology section with Dr. Alfred Weber Chief Radiology, Massachusetts Eye and Ear Infirmary; Dr. Pedro Prager Chief Bone Section, Department of Radiology, University of Heidleberg; and Dr. James Dreisbach Neuroradiologist,Fitzsimons Army Medical Center,as principal guest speakers. — May 1978

3. 2nd General Hospital, Landstuhl, Germany - monthly conference, basic radiology review for general medical officers, nurse clinicians, and physicians' assistants. — 1977 - 1978

4. 2nd General Hospital, Landstuhl, Germany - monthly radiology department conference with clinical specialists invited as guest speakers. — 1977 - 1978

PAPERS:

1. "Sonographic in Utero Appearance of Kleeblattschädel Syndrome". Brahman, S. L., et al, submitted for publication, J. Clinical Ultrasound.

APPLICATION/PETITION FOR PROFESSIONAL PRIVILEGES FOR AMED OFFICERS & CIVILIAN HEALTH PROFESSIONALS

FREE COPY

Ex. 6

1. Last Name	First Name	Middle Initial	2. Service Number
SAMPLE,	DONALD	W.	

3. Grade and Corps	4. Date of Assignment	5. MOS and Assignment
Colonel, Medical Corps	2 August 1976	60C - Deputy for Healt and Environment Activi

6. PROFESSIONAL EDUCATION (Civilian Only)

Name of Professional School	Location	Years attended	Completed Day	Mo	Yr	Degre
University of Washington School of Medicine	Seattle, Washington	4		6		M.D.
Harvard University School of Public Health	Boston, Massachusetts	1		6		M.P.H

7. INTERNSHIP (Do not include residencies)

Name of Hospital, Health Facility or Clinic	Location	Type	Completed Day	Mo	Yr	Time (mont
District of Columbia General Hospital	Washington, D. C.	rotating	30	6	56	12

8. RESIDENCIES AND FELLOWSHIPS

Name of Hospital or Institution	Location	Type of Residency and/or Fellowship	Completed Day	Mo	Yr	Time (mont
Letterman Army Hospital	San Francisco, California	internal medicine		7	58	18
Minnesota State Department of Health	Minneapolis, Minnesota	public health		6	60	12
WRAIR and Walson Army Hospital	Fort Dix, New Jersey	preventive medicine		6	61	12

9. APPROVAL DATA

Date of Review	Signature of Supervisor	Date of Review	Signature, Chief, Professional Services
		20 JAN 1978	George L. Baker

10. HOSPITAL PRIVILEGES TO BE EXTENDED

practice of preventive medicine/public health

certification by the American Board of Preventive Medicine in Public Health - 1965

member American Public Health Association, International Health Society

No privileges, memberships or licenses have ever been revoked, suspended, reduced or not renewed.

WRAMC FORM 1430
1 FEB 75

CURRICULUM VITAE

NAME: William J. Neglia

Married to: [redacted]

Address: Radiation Therapy Service
Walter Reed Army Medical Center
Washington, D.C. 20012

Academic History:

Carson - Newman College Jefferson City, Tenn.	B.S. Chemistry Biology
Medical College of Georgia Augusta, Georgia	M.D.

Professional Experience:

Straight Medicine Internship, William Beaumont Army Medican Center
El Paso, Texas July 1973 - July 1974

The University of Texas System Cancer Center
M.D. Anderson Hospital and Tumor Institute, Houston, Texas July 1974 - 1977. Post - Doctoral Clinical Fellowship in Straight Radiation Therapy (with rotations to St. Joseph Hospital, Houston, Texas, Hermann Hospital, Houston, Texas and TAMVEC Cyclotron Facility, Texas A & M University, College Station, Texas)

Walter Reed Army Medical Center: Assistant Chief of Radiation Therapy 1977 - 1978
Chief Radiation Therapy Service 1978
Assistant Professor of Radiology - Georgetown University Medical School 1978

Specialty Certification:

Certified in Therapeutic Radiology by the American Board of Radiology June 1977.

Awards:

First Place Award - M.D. Anderson Hospital and Tumor Institute
Annual Research Award for Fellows and Clinical Investigators. 1976

Publications

Neglia, B., Hussey, D., and Johnson, D., Megavoltage Radiation Therapy for Carcinoma of the Prostate.
International Journal of Radiation Oncology, Biology, Physics
2:873-882, 1977

Ex. 6

CURRICULUM VITAE

NAME: KAMINSKI, Robert J.

DATE AND PLACE OF BIRTH:

WIFE'S NAME:

CHILDREN'S NAMES AND AGES:

Ex 6

MILITARY SERVICE: U.S. Army Medical Corps; 1971 to present

ACADEMIC AND PROFESSIONAL EDUCATION:

	University of Detroit, Detroit, Michigan
	B.S. (Experimental Biology), University of Michigan, Dearborn, Michigan
	M.D., Tulane University, New Orleans, Louisiana
1971 - 1972	Straight Surgery Internship, Walter Reed Army Medical Center, Washington, D.C.
1972 - 1975	Diagnostic Radiology Residency, Walter Reed Army Medical Center, Washington, D.C.
1975 - 1977	Nuclear Medicine Fellowship, Walter Reed Army Medical Center, Washington, D.C.

HOSPITAL/TEACHING APPOINTMENTS:

1977 - 1978	Assistant Chief, Nuclear Medicine Service, Walter Reed Army Medical Center, Washington, D.C.
1978 - present	Chief, Nuclear Medicine Service, Walter Reed Army Medical Center, Washington, D.C.
1978 - present	Assistant Clinical Professor of Radiology, The George Washington University School of Medicine and Health Sciences, Washington, D.C.

BOARD CERTIFICATION:

1975	American Board of Radiology (Diagnostic Radiology)
1976	American Board of Radiology (Diagnostic Radiology with Special Competence in Nuclear Radiology)
1977	American Board of Nuclear Medicine

MEDICAL LICENSURE:

1971	Louisiana
1972	Maryland
1975	District of Columbia

AWARDS AND HONORS:

1967	Distinguished Scholar Award and Scholastic Key, University of Michigan
1967	B.S. with high distinction, University of Michigan
1971	Alpha Omega Alpha (honor medical society)
1971	M.D. with honors, Tulane University

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PROFESSIONAL SOCIETIES:

American College of Radiology
Society of Nuclear Medicine
American Medical Association
Radiological Society of North America
Society of the Sigma Xi

SCIENTIFIC ARTICLES AND ABSTRACTS:

Hertzler EC, Kaminski RJ: Compact stimulator using integrated circuits and battery power. Journal of Applied Physiology 24:249-251, 1968.

Kaminski RJ, Meyer GA, Winter DL: Sympathetic unit activity associated with Mayer waves in the spinal dog. American Journal of Physiology 219:1768-1771, 1970.

Corcoran RJ, Thrall JH, Kaminski RJ, Varma VM, Johnson MC: Body-background defects with ^{99m}Tc-DTPA after renal transplantation: case reports. Journal of Nuclear Medicine 17:696-698, 1976.

Corcoran RJ, Thrall JH, Kyle RW, Kaminski RJ, Johnson MC: Solitary bone scan abnormalities in patients with extraosseous malignancies. Radiology 121:663-667, 1976.

Gross R, Johnson LF, Kaminski RJ: Esophageal emptying in achalasia, quantitated by a radioisotopic technique. Gastroenterology 72:1159, 1977.

Gross R, Johnson LF, Kaminski RJ: Esophageal emptying in achalasia, quantitated by a radioisotopic technique. Clinical Research 26:17A, 1978.

Gross R, Johnson LF, Kaminski RJ: Improved esophageal emptying in achalasia after pneumatic dilation assessed by changes in symptoms, LES pressure (LESP) and a pH reflux test. Gastroenterology 74:1042, 1978.

Gross R, Johnson LF, Kaminski RJ: Reliability of symptom assessment, LES pressure (LESP) and barium meal to predict rate of esophageal emptying in achalasia. Gastroenterology 74:1043, 1978.

HARRY L. THURMAN

Residence

Ex. 6

Walter Reed Army Medical Center
New Hospital Project Office
Bldg. 93
Washington, D.C., 20012

-OBJECTIVE-

Director of Engineering, Research and Development in an electrical or electronics oriented business.

-SUMMARY-

Areas of technical specialization: Electric utility systems, Satelite/microwave/telecommunications information systems, Health care and environmental systems, Atomic power propulsion and generation, Shipboard electronics.

Mobilized engineers/scientists, corporate assets and functions to carry out complex systems designs through to production.

Created a financial base for R&D through customer contracted studies and corporate joint ventures.

Developed complete business plans, corporate strategy for entry into new products markets, international and domestic.

A consultant who has evaluated organizational, product and technical viability to achieve profitable growth of several operations.

-AREAS OF EFFECTIVENESS-

Electrical & Electronics Engineering	+ Designed, installed and tested: (A) the first carrier microwave system for "Power Pool" operation of multiple electric utilities, (B) The first production atomic power plant instrumentation and control for fleet submarines.
	+ Established reliability testing techniques Component and design standards, configuration control and developed a model for predicting failure modes of a complex shipboard weapons system. This later became a MIL spec.
Research & Development	+ Technical Director of coherent optics research program encompassing 10 divisions and 125 engineers/scientists: (A) First mega-megawatt laser, (B) Prototype sheet metal laser welder, (C) Feasibility studies of military applications.
	+ I directed many feasibility studies for DOD: Tactical & shipboard aircraft control, through the earth communications, transmitter and antenna multicoupling, passive viewing, and communications integrity.

Research & Development	+ Lead health care new products development (12 scientists) in electronic and computer based enhancement techniques to improve diagnostic x-ray and nuclear data presentations.
Systems Design	+ I designed and implemented closed loop TV systems for five fringe area communities.
	+ Directed a low cost satelite communications system ground station design including microwave and telecommunications links for sale to foreign countries.
	+ Lead a standard systems design program for diagnostic & special procedures x-ray, and radiotherapy & teletherapy treatment systems to reduce hardware costs and improve reliability.
Management	+ I have an excellent record in the direction of multi-project organizations meeting technical specs., financial objectives (good profit, controlled costs), and delivery commitments of the customer. I enjoy a high acceptance (approx. 35%) of bids and proposals for goods and services to foreign countries, Gov't agencies and corporations.
	+ Experienced in effective liaison intracompany, architects (naval & engineering) ship builders, contractors, gov't agencies.
	+ I have developed and presented to corporate executives complete business plans and corporate strategy for entry into several new product markets, foreign and domestic.
	+ As a consultant I have evaluated organizational, product and technical viability to achieve profitable growth in six organizations.
	+ Implemented manpower utilization programs and business planning techniques to provide profit objectives and operational guide lines for marketing, engineering, finance and manufacturing.
Finance	+ Participated actively in the financial planning cycle, developed cash flow requirements, forecast asset turn over to achieve cost and profit objectives.
	+ I have guided foreign countries through the permit and paper maze to establish credit and means of delivery for domestic products purchased.

Marketing	+ I am skilled at making customer presentations.
	+ Prepared short and long range marketing plans to achieve greatest effectiveness of marketing channels.
	+ Lead the development of new product specifications, established selling price, and estimated development costs.
Manufacturing	+ To close the gap between prototype and finished product I have developed workable product transition concepts.

-EMPLOYMENT-

1971 - 1974	CGR Medical Corp.	Systems Manager Nat. Service Mgr.
1955 - 1971	Westinghouse Electric Corp.	Section Manager Technical Director
1948 - 1955	U. S. Dept., Interior, BPA	Asst. to Chief Engr.

-EDUCATION-

Special Studies	Chicago University	Cryogenic Techniques
Special Studies	Columbia University	Coherent Optics
M. S.	Oregon State University	Electronics/Power Engr.
M. S.	Oregon State University	Math., Physics
M. A. Studies	Geo. Wash. University	Business Management
M. A. Studies	University of Pitsburg	Business Management
B. S.	Oregon State University	Engineering

-PUBLICATIONS-

1949 Dynamic Impedance Characteristics of Horn Type Loudspeakers
1964 Laser Applications
1964 A New Product Line - The Laser Welder
1966 Manpower Planning
1967 Motivating the Engineer
1968 Intelsat and International Communications Market Study
1969 Health Care Industry, Communications and Data Management New Products Study

-AWARDS & HONORS-

Eta Kappa Nu	Electrical Engineering
Sigma Tau	Engineering
Delta Sigma Rho	Forensics
Sigma Pi Sigma	Physics
Sigma Phi Epsilon	Social Fraternity

Counselor, Gifted Student Program, Maryland Academy of Science
Member, Advisory Council, YMCA Industrial Round Table
Member, AIEE Technical Lecture Series
Vice Chairman, Management Session, ASME Winter Meeting, 1967
Instructor, Engineering Management

-PROFESSIONAL LICENSES-

Registered Professional Engineer, Maryland, Number 6456
Registered Biomedical Engineer, AAMI, 1974 to present

CURRICULUM VITAE

for

ROBERT M. QUILLIN, M.S.P.H., M.S.

Date and Place of Birth:

Home Address:

Home Telephone Number:

Office Address: Health Physics Office
Walter Reed Army Medical Center
Washington, DC 20012

Office Telephone Number: (301) 427-5161

Degrees: M.S.P.H. - Radiological Health -
University of North Carolina
Chapel Hill, NC

M.S. - Sanitary Engineering -
Ohio State University
Columbus, Ohio

B.E. - Civil Engineering -
Yale University
New Haven, Connecticut

Certification Health Physics, American Board of Health Physics, July 1971.

Professional and Technical Societies

American Association of Physicists in Medicine
American Public Health Association
Health Physics Society

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Chronological Experience:

1978 - present	Chief, Health Physics Office Walter Reed Army Medical Center Washington, DC 20012
1972 - 1978	Senior Radiation Physicist and Administrator Department of Radiology Walter Reed Army Medical Center
1971 - 1972	Senior Radiation Physicist Department of Radiology Walter Reed Army Medical Center
1969 - 1971	Staff Radiation Physicist Department of Radiology Walter Reed Army Medical Center
1968 - 1969	Student Academy of Health Sciences Brook Army Medical Center Fort Sam Houston, TX
1967 - 1968	Radiological Hygiene Consultant US Army, Viet Nam
	Executive Officer 20Th Preventive Medicine Unit Viet Nam
1964 - 1967	Health Physicist US Army Environmental Hygiene Agency Aberdeen Proving Ground, MD
1963 - 1964	Graduate Student University of North Carolina Chapel Hill, NC
1961 - 1963	Staff Officer, Surgeon's Office Headquarters, 1st Region US Army Air Defense Command Fort Totten, NY
1959 - 1961	Health Physicist US Army Env-ronmental Hygiene Agency Aberdeen Proving Ground, MD
1957 - 1961	Graduate Student Ohio State University Columbus, OH

Continuing Education:

1960 - 1978	Fifteen (15) one-week or longer short courses, e.g. Non-Ionizing Radiations: Bioeffects, Massachusetts Institute 1978; Radiation Accident Management, Oak Ridge Associated Universities, etc.

Experience Summary:

Sixteen (16) years of applied Health Physics and Radiation Physics experience. Currently Director of the Health Physics Program for Walter Reed Army Medical Center. The Center's program provides comprehensive Health Physics support to a 1280-bed hospital, the Walter Reed Army Institute of Research, the Armed Forces Institute of Pathology, the US Army Medical Research Institute of Infectious Diseases and certain other activities in the Washington area. The program monitors four (4) Nuclear Regulatory Commission By-Product Licenses, a Special Nuclear Material License and a Source Material License. The program encompasses approximately 150 laboratories using radioactive materials, 160 X-ray units, 115 microwave devices, 25 high intensity light sources and 900 individuals on personnel monitoring. Also responsible for the training, equiping and direction of the only Army Radiological Advisory Medical Team, a nuclear accident/incident control team. Previous Health Physics experiences included evaluation of industrial facilities, reactors, and environmental aspects. Radiation Physics experience encompassed applied physics in Radiation Therapy, Nuclear Medicine and Diagnostic Radiology. This involved lecturing to residents and staff, dosimetry and measurement, equipment specification, evaluation and procurement, facility design, and radiology quality control. Integrated with the Radiation Physics was experience as the Administrator of a Radiology Department which underwent substantial expansion and modernization, relocating twice and increasing in staff from approximately 75 to 200 and size by a factor of over three. While assigned to Walter Reed Army Medical Center have also represented the Army Surgeon General on numerous committees and task forces including, for example, the Federal Interagency Working Group on Medical Radiation, the DOD Committee on Radiology Space Planning Criteria, ANSI Committee N44, and the Tri-Service Medical Information Systems Task Group on Radiology Systems. Professional society activities have included Chairman, Teaching Committee, Secretary-Treasurer and President of the Mid-Atlantic Chapter of Physicists in Medicine, Representative of the American Association of Physicists in Medicine to ANSI N-44, and Representative of the American Public Health Association to the National Conference on X-Ray Referral Criteria.

BIBLIOGRAPHY

1. W. L. Saylor and R. M. Quillin: "Methods for the Enhancement of Skin Sparing in Cobalt-60 Teletherapy," American Journal of Roentgenology, Radium Therapy and Nuclear Medicine, January 1971.

2. M. Gillin and R. M. Quillin: "Variation in Output with a fixed Dose Setting on a 4 MV Linear Accelerator," presented at 15th Annual Meeting AAPM, August 1973.

3. M. Gillin and R. M. Quillin: "Split Field Isodose Curves on a 4 MV Linear Accelerator," presented at 15th Annual Meeting of AAPM, August 1973.

4. "Radiation Protection Guidance for Diagnostic X-Rays," Federal Guidince Report No. 9, Environmental Protection Agency, Interagency Working Group on Medical Radiation, October 1976.

CURRICULUM VITAE FOR ROBERT GOLDEN, M.S.

Born:

Degrees:

A.B.; University of California, Berkley, major in Physics

M.S.; Colorado University, Denver, major in Radiological Physics, Colorado University Medical Center

Postgraduate Studies:

U.S. Naval Radiological Defense Laboratory, San Francisco, University of California Extension
San Francisco State University
U.S. Public Health Service, Cincinnati, Ohio
Colorado Department of Public Health and A.E.C. at Denver University

Military Service:

U.S. Army Air Force, 1942-46, Motion Picture Photographer

Membership in Professional Societies:

American Institute of Physics
American Association of Physicists in Medicine (charter member)
Health Physics Society
Ohio Academy of Science
Texas Regional Medical Program

Certification:

Radiological Physics, American Board of Radiology, June, 1970

Pertinent Employment:

1. U.S. Naval Radiological Defense Laboratory, San Francisco, California, 1950-61; GS 5 - GS 11
2. Colorado University Medical Center, Denver, Colorado, 1962-66 Radiation Safety Officer, Master's Degree Student, and associate physicist in Radiation Therapy Department
3. University Hospitals, Case-Western Reserve University, Cleveland, Ohio, 1966-68, Radiologic Physicist
4. Radiological Physics Center, M.D. Anderson Hospital and Tumor Institute, Houston, Texas, 1968-72
5. Youngstown Hospital Association, Youngstown, Ohio, 1972-76, Radiation Physicist
6. Walter Reed Army Medical Center, Washington DC, 1976- Present, Radiation Physicist

Robert Golden
[redacted]
Physicist Ex 6

PUBLICATIONS

1. E. Tochilin and R. Golden: Film Measurement of Beta-Ray Depth Dose. Nucleonics II, No. 8, 26 (1953).

2. E. Tochilin, S.W. Ross, B.W. Shumway, G.D. Kohler and R. Golden: Cyclotron Neutron and Gamma-Ray Dosimetry for Animal Irradiation Studies. Radiation Research 4:158 (1956).

3. S. W. Ross, R. Golden: Calibration of Nucleonics Division UDM-1 Co-60 Source. Technical Memorandum #56 (1956).

4. B.W. Shumway, and R. Golden: Physical Characteristics of an Electron Beam from a 2-Mev Van De Graaff Generator. Radiology 68:104 (1957) (abstract).

5. B.W. Shumway, R. Golden, and R.V. Alves: Some Characteristics of Monoenergetic Electron Depth Dose Curves and Their Use in Predicting Beta-Ray Depth Dose Curves. Radiation Research 9:183 (1958) (abstract).

6. R. Golden and E. Tochilin: Characteristic Curves From Different Ionizing Radiations and Their Significance in Photographic Dosimetry. Health Physics 2:199 (1959).

7. E. Tochilin, and R. Golden: Investigations on the Relative Beta-to-Gamma Ray Sensitivity of Photographic Emulsion. USNRDL-TR-381 (1959).

8. T.T. Mercer, and R. Golden: The Application of High Intensity Pre-Exposure to Film-Phosphor Dosimetry. Health Physics 8:357 (1962).

9. T.T. Mercer, and R. Golden: Response of Photographic Emulsions to Thermal and Epithermal Neutrons. Health Physics 9:187 (1963).

10. A. Feldman, M.M.D. Williams, J.A. Anderson and R. Golden: Timing Corrections in Exposure Rate Measurements. Presented at the AAPM meeting in Chicago, Illinois, December 3-4, 1965. Physics in Medicine and Biology (abstract).

11. R. Golden: The Usefulness of Thermoluminescent Dosimetry in Depth Dose Measurements. Thesis for Degree of Master of Science. University of Colorado (1966).

12. W.R. Hendee, R. Golden, C. E. Garciga, D.B. Gilbert, G.S. Ibbott. Presented at the Annual Meeting of the Radiological Society of North America. December (1967) Chicago, Illinois.

13. R. Golden: An investigation into the possible causes of 203 Hg Body Burdens in Isotope Technicians at the University of Colorado Medical Center. Health Physics 15:181 (1968) (abstract).

14. R. Golden, R.J. Shalek: Preliminary Report from the Radiological Physics Center. Presented at the Annual Meeting of the American Association of Physicists in Medicine, December 5-7, 1968, Chicago, Illinois. Physics in Medicine and Biology 14(2):337, April 1969 (abstract)

Ex 6 [redacted] Physicist

15. R. Golden, and M.K.K. Pillai: Isocentric Dosimetry for the 6 MV Radiotherapy Linear Accelerator. Presented at the Second International Conference on Medical Physics, Boston, Massachusetts, August 11 - 15, 1969.

16 R. Golden, Jackson H. Cundiff, Walter H. Grant III, Robert J. Shalek: A Review of the Activities of the AAPM Radiological Physics Center in Interinstitutional Trials Involving Radiation Therapy. Cancer, Vol. 29, No. 6, June 1972.

17. Mary Peterson, R. Golden: Dosimetry of the Varian Clinac-4 Linear Accelerator - 1. Basic Radiation Parameters: Radiology, Vol. 103, No. 3, 675-680, June 1972.

18. J.H. Cundiff, J.R. Cunningham, R. Golden, L.H. Lanzl, M.L. Meurk, J. Ovadia, V. Page Last, R.A. Pope, V.A. Sampiere, W.L. Saylor, R.J. Shalek, and N. Suntharalingham: A Method for the Calculation of Dose in the Radiation Treatment of Hodgkin's Disease. American Journal of Roentgenology, Radium Therapy and Nuclear Medicine,, Vol. CXVII, No. 1, January 1973.

19. R. Golden, D. Starchman: Effect of Adjacent Cavity on Ionization-Chamber Measurements in a Phantom for 1.25-MeV to 25-MV Photon Beams. Medical Physics, Vol. 1, No. 2, 1974

Insert #3

Ex 6 Robert Golden [redacted] Physicist

RESUME OF PERTINENT EMPLOYMENT

U. S. Naval Radiological Defense Laboratory, San Francisco, California

Mr. Eugene Tochilin, Supervisor

Employed 1950-1961

Research Physicist in Nuclear Radiation Dosimetry

A significant part of my work was in photographic radiation dosimetry. It was applied to gamma-ray, beta-ray, x-ray, neutron and charged particle dosimetry. The various parameters involved in the response of film dosimeters to radiation of different energies was studied. To do this, effective energies and intensities of x-ray beams were measured; the neutron fluence and intensities were measured for the 60" Berkeley cyclotron, the Livermore water-boiler reactor, and the Los Alamos Godiva reactor.

Ionization chambers such as the Victoreen, Argonne, Landsverk and Sievert chambers were used extensively. As new radiation detectors became available or showed promise of being useful, they were tested for sensitivity, energy dependence, does-rate dependence, geometrical effects, fading, and practicality for use by the U.S. Navy. An example is the glass fluorod. These studies were made possible by the supporting techniques of scintillation spectrometry, neutron spectrometry, the use of scintillation well counting, dip counting, geiger-tube counting, and the preparation of samples. Specialized equipment was designed and built. Examples are a partial body neutron shield, a sensitometer, surface ionization chamber, and source calibration jigs.

Typical projects carried out by me were the evaluation of the response of a Polaroid casualty film dosimeter, formation of tissue-equivalent material for x-rays and neutrons, feasibility studies of neutron radiography, and studies designed to formulate a film-phosphor dosimeter.

I calibrated x-ray machines such as a 50 KVP beryllium window unit, a Westinghouse 250 KVCP therapy unit, a G. E. Maxitron, and 1000 KVP G. E. industrial radiographic unit.

Occasionally I provided consultation service for the Biomedical Research programs.

Robert Golden
[redacted]
Physicist

Unive ity of Colorado Medical Cent Ex 4
4200 East Ninth Avenue, Denver, Colorado 80220
Assigned to the Section of Radiotherapy
Dr. Carlos E. Garciga, is Head of Radiotherapy
and Assistant Professor of Radiology

Employed as Radiation Safety Officer, 1962-1966

My activities at this Medical Center included responsibility of the radiation safety program, formal studies toward a Master's degree, research in Radiotherapy and Nuclear Medicine problems, and carrying on research in the field of thermoluminescent dosimetry.

My association in radiation therapy consisted in working on individual problems such as calculating exposure rates at various points surrounding radium applications and implants, calculating isodose lines for single and double treatment fields, calibrating x-ray units, and consulting on problems in radiological physics such as protection plans, calculating patient dosage from diagnostic exposures, and calculating internal dosage due to application of radioactive isotopes.

Calibrations consisted of Half Value Layer measurements and intensity measurements of radiations from diagnostic and therapy x-ray machines and for a 60 cobalt therapy unit. For one year during the absence of the radiological physicist, I functioned in that capacity, with the exception of teaching, in addition to my regular duties.

The radiation safety program was developed by me early in 1962 to follow the provisions of a recently granted Broad Medical License, the radiation safety rules, and 10 CFR 20.

Routine monitoring was started for radiation levels, radioactive contamination in laboratories and occasional checking of the release of activity to the environment was initiated. Monitoring was started to check exposure of personnel from isotopes and radium used in radiation therapy, to check hazards from x-rays used in the hospital and Medical Center and from all sources of ionizing radiation, by surveys, use of film badges, and pocket chambers.

To assist users of isotopes, consulting was done to assess radiation exposure to experimental and clinical subjects given isotopes. With the increasing use of new isotopes and isotopes of increasing activity, planning was done to provide safe, yet convenient methods of handling these materials.

Included in the consulting were the calculations of room shielding for diagnostic use, and irradiation of experimental materials by x-rays. Calculations were made to predict the radiation levels expected from a 6500 Curie Cobalt therapy unit in a new therapy room and the transfer of the unit from one location to this room was accomplished smoothly.

An irradiation facility for medium sized animals was planned by me and with minor changes, the plans were accepted by the granting agency, the National Institute of Health.

A program for monitoring hospital isotope technicians by whole body counting was instituted in 1962 and has been successful in showing trends in the buildup of body burdens of diagnostic isotopes. With this information it has been possible to seek out and prevent the improper handling or storage of radioisotopes.

Insert #)

Ex6 Robert Golden [redacted] Physicist

Department of Radiology
University Hospitals, Case-Western Reserve University
University Circle, Cleveland, Ohio 44106

Assistant Radiation Physicist and Senior Instructor
under E. C. Gregg, Phd.
July 1966 to July 1968

The primary duties of this position are of treatment planning in radiation therapy, followed by research in problems in therapy, and finally by instruction of radiology residents on a personal basis. Additional duties are calibrations of therapy equipment, maintenance of therapy equipment, development of radiation detecting equipment, responsibility for all radium calculations and radium handling, and formal teaching of x-ray physics to x-ray technician students.

Treatment planning has been almost exclusively for multiple field irradiations by a 2 M V Van de Graaff and 6 Mv Varian Clinac. As an aid to the planning, equipment and techniques have been developed to simplify set-up procedures.

Calibrations have been carried out for the above named equipment, and for ortho-voltage and low energy (100 KVP) x-ray units. Thermoluminescent dosimeters have been used for obtaining depth dose curves, and for investigating the radiation dose at points in the bladder and rectum during radium applications. The technique of measuring bladder and rectal exposure directly by scintillation counting, and correlating with calculations of exposure was instituted by me.

TLD dosimeters have been used in Alderson phantoms to check calculated dose distributions in treatment planning.

A film dosimetry program has been set up to measure dose distributions by the method of edge-on exposure in a tissue equivalent phantom, to evaluate the usefulness of this method, and determine under which conditions the dose distributions obtained are valid.

Consultation has been in protection planning, planning radiobiological experiments with respect to the physics of irradiation, the distribution of exposure rates in an animal irradiator, measurement of disgnostic radiation levels, evaluation of performance of lightweight diagnostic x-ray units, and calibrations of x-ray units in other nearby hospitals.

Robert Golden
[redacted]
Physicist

Ex 6

Radiological Physics Center (RPC)
Physics Department, The University of Texas
M. D. Anderson Hospital and Tumor Institute at Houston
Houston, Texas
R. J. Shalek, PhD., Director

Assistant in Physics, August, 1968 - November, 1971

As senior physicist, I organized procedures and designed protocols for the evaluation of fulfillment of treatment dose by radiotherapy departments participating in national clinical trial studies. The evaluations were based on the results of interviews; measurement of radiation beam parameters which would affect delivered dose; reviews of the dosimetry of patient's charts; a simulated treatment cycle to an Alderson anatomical phantom loaded with lithium fluoride dosimeters.

In my first year with the RPC, there were visits by me to twenty three institutions participating in at least one of the three clinical trials: Hodgkin's Disease, Methotrexate, and Carcinoma of the Prostate. Radiation beam measurements were made of photon and electron beam units, with beam energies ranging from cobalt gamma-rays to 33 MV photons.

Responsible to me were a junior physicist, part-time secretaries, a technician, two summer students, and one post-doctoral fellow. The RPC laboratory developed and tested zero-air volume LiF (powder) dosimeters, utilizing "Throwaway" lithium fluoride. Techniques were developed for the evaluation of dose in the Alderson phantom, by ion chamber and Lif. Studies were made of the usefulness of various tissue-equivalent phantom materials. Specialized equipment was designed and built, such as a portable tank for measurement of depth dose in water. Starting from an experimental approach, the RPC, for the Hodgkin's Disease mantle field, clarified the contributions to tumor dose due to various parameters inherent in the mantle field. Intensive studies were made to evaluate the performance of radiation measuring equipment and thermoluminiscent readout.

Considerable time has been spent by me in evaluating measurement data, patient dosimetry, and analyzing concepts and calculative methods utilized by various institutions for determining tumor dose. Each evaluation has become a document, of a form originated by R. J. Shalek, which summarizes the conclusions and reduces to a simple statement,-- the ratio of tumor dose delivered to dose prescribed.

Ex 4 [redacted] Physicist

Department of Radiology

Youngstown Hospital Association
North Unit - Gypsy Lane and Goleta Ave.
South Unit - 3450 Oak Hill Ave.
Youngstown, Ohio

Radiation Physicist and Radiation Protection Officer, Nov. 1971 —
M.F. Sheridan, M.D. Supervisor in Radiation Therapy, South Unit
L.E. Slusher, M.D. Supervisor in Radiation Protection, South Unit

For almost four years my schedule was 80% Radiation Therapy and 20% in the physics of diagnostic x-rays, nuclear medicine, teaching physics and radiation safety. More recently the balance shifted to 50% Radiation Therapy with more effort going into diagnostic radiology. In every area I have worked alone, however in diagnostic radiology and nuclear medicine assistance was always available for specific problems. At present there is an open position for trainee in Radiation Protection at $575 per month.

In Radiation Therapy, I reviewed working data and dosimetry methods for orthovoltage x-rays, cesium applications, and 4 MV X-Rays. Procedures were improved, improvements in dose calculations were instituted, calculations for some irregular fields were done on a rational basis, and new devices for treatment aids were developed or introduced. These included distance indicators, use of lasers, and treatment verification films. A most important improvement was the introduction to the use of computer calculated isodose data for rotational fields and cesium applications, utilizing a telecopier and computations from M.D. Anderson Hospital. From the beginning I worked to utilize the YHA computer (IBM 370) for irregular fields using programs based on Cunningham's work. I initiated chart checking, documentation and organization of calculational work, and started a comparative study of the errors in our two dimensional, film based method for calculation of dose for cesium applications. At present, a therapy technician calculates cesium cases, rotational cases, and plans multiple field cases. She and other technicians calculated simple fixed field or parallel-opposed field cases, under the direction of the Radiation Therapist. I started the use of plaster casts and wax molds for cases in which bolus is required. The use of cast lead blocks was started in 1972 by myself. Thermoluminescent dosimeters and ion chamber measurements were used when calculations were subject to unusual error. My approach to this position was (1) service, (2) teaching and (3) some research.

The radiation safety program was changed from simply collecting film badge reports to an active effort to reduce exposure to everyone involved. This included special lectures to nursing groups, more radiation surveys, personal involvement in problem areas of radiation protection, and creating interest in quality control and use of protective devices and techniques. At the administrative level, organized safety rules were proposed and a radiation protection committee and medical isotopes committee were formed. Appropriate records and documents were

organized for quick reference, three separate licenses for use of by-product material were updated, amended periodically, renewed in 1972, and finally consolidated in 1975.

In diagnostic radiology, protection planning for new x-ray rooms, checks on new x-ray units, and monitoring for problems with older equipment were done. I assisted in the acquisition of a new cesium-iodide image intensifier and recorder with instant playback for the Cardiovascular laboratory. We are training technicians and students to use a sensitometer, test pattern, Ardran-Crokes cassettes and a densitometer to improve diagnostic x-ray quality control.

In Nuclear Medicine I materially assisted in the acquisition of a gamma-camera for both North and South Units by gathering technical information and data bearing on the economies of the use of these devices. I provided physics input with respect to new procedures, calibrations, instruction of personnel, and periodically surveyed for radiation levels, and contamination.

My efforts with two Ultrasound groups were to act as part time advisor with two Youngstown State University students in the Astronomy-Physics Department. Their project is to experimentally determine characteristics of the ultrasound beam and develop methods for improving quality control.

PLEASE BE SURE TO READ ATTACHED INSTRUCTIONS BEFORE COMPLETING ITEM 20

20. EXPERIENCE (Start with your PRESENT position and work back. Account for periods of unemployment in separate blocks in order.)

May inquiry be made of your present employer regarding your character, qualifications, and record of employment? ..... ☒ Yes ☐ No
(A "No" will not affect your consideration for employment opportunities except for HEARING EXAMINER positions.)

1

Dates of employment (month, year)	Exact title of position	If Federal service, civilian or military grade
From 5/17/76 To PRESENT TIME	Radiation Physicist	GS 1310

Salary or earnings	Avg. hrs. per week	Place of employment	Number and kind of employees supervised	Kind of business or organization (manufacturing, accounting, insurance, etc.)
Starting $ 22, 906 per Present GS-13 step-3	40	City: Washington State: D.C.	1 Phys. Sci tech 1 Model Maker	Hospital 1 Summer Student

Name of immediate supervisor: Wm. Neglia, M.D.
Area Code and phone No. if known: (202)576-3575
Name of employer (firm, organization, etc.) and address (including ZIP Code, if known): Walter Reed Army Medical Center, Dept of Radiology Radiation Therapy SVC. Washington D.C. 20012

Reason for wanting to leave: Seeking Career Improvement

Description of duties, responsibilities, and accomplishments: Senior physicist and head of physics section.
Please see enclosed position description.
Awarded "Outstanding" in first year.

For agency use (skill codes, etc.)

2

Dates of employment (month, year)	Exact title of position	If Federal service, civilian or military grade
From Nov 1971 To May 1076	Physicist	N.A.

Salary or earnings	Avg. hrs. per week	Place of employment	Number and kind of employees supervised	Kind of business or organization (manufacturing, accounting, insurance, etc.)
Starting per yr. Final per	40	City: Youngstown State: Ohio	none	Community Hospital

Name of immediate supervisor: See Below
Area Code and phone No. if known:
Name of employer (firm, organization, etc.) and address (including ZIP Code, if known): Youngstown Hospital Association 345 Oak Hill Ave. Youngstown, Ohio 44501

Reason for leaving: Stagnation in Radiation Therapy. Cannot perform at professional level.

Description of duties, responsibilities, and accomplishments: Radiation Therapy-Treatment planning, calibrations, radium curator, solve physics problems as requested by radiation therapist. initiate new ideas in quality control, physics input
Nuclear Medicine - consulting, teaching, surveys, physics input
Supervisor: Radiation Therapy - M.F. Sheridan, M.D. Please do not inquire
Supervisor: Radiation Protection - Lloyd E. Slusher, M.D. Please do inquire.

For agency use (skill codes, etc.)

3

Dates of employment (month, year)	Exact title of position	If Federal service, civilian or military grade
From July 1968 To Nov. 1971	Assistant in Physics	N.A.

Salary or earnings	Avg. hrs. per week	Place of employment	Number and kind of employees supervised	Kind of business or organization (manufacturing, accounting, insurance, etc.)
Starting per year Final per year	40	City: Houston State: Texas	2 Junior physicist Technician	State Hospital

Name of immediate supervisor: R.J. Shalek, PhD.
Area Code and phone No. if known: (713) 792-3230
Name of employer (firm, organization, etc.) and address (including ZIP Code, if known): Radiologic Physics Center, M.D. Anderson Hosp. & Tumor Institute, Houston, Texas 77025

Reason for leaving: Originally planned to stay 2 years. This was a temporary position.

Description of duties, responsibilities, and accomplishments: Senior Physicist - RPC - Organized and operated, under R.J. Shalek, a project funded by N.I.H. to evaluate the faithfulness by which prescribed radiation therapy dose is delivered by institutions participating in certain national clinical trials.

For agency use (skill codes, etc.)

STANDARD FORM 171

PERSONAL QUALIFICATIONS STATEMENT

Office of Management and Budget
Approved: 50-R018

1A. Kind of position (job) you are filing for (or title of announcement): Radiological Physicist

B. Announcement No.:

C. Options for which you wish to be considered (if listed in announcement):

D. Primary place(s) you wish to be employed: Washington D.C. area

2. Home phone (including Area Code):

3. Office phone (including Area Code): (202) 576-3575

4. Name (Last) (First) (Middle) (Maiden, if any) and Address (Number, Street, City, State and ZIP Code): [X] Mr. [ ] Miss [ ] Mrs.

Golden, Robert NMI

5. Legal or voting residence (State): Maryland

6. Height without shoes:

7. Weight:

8. Birthplace (City and State or foreign country):

9. Birth date (Month, day, year):

10. Social Security Account Number:

11. If you have ever been employed by the Federal Government as a civilian, give your last classification series, grade, and job title.

GS-1310 Radiation Physicist

Dates of service in that grade
From To

12. If you are currently on a list of eligibles for appointment to a Federal position, give the name of the announcement, the name of the office maintaining the list, the date on your notice of rating, and your rating.

13. Lowest pay or grade you will accept

PAY		OR	GRADE
$	per		GS-13

14. When will you be available?

1 month

15. Will you accept temporary employment for: (Acceptance or refusal of temporary employment will not affect your consideration for other appointments.)

	YES	NO
1 month or less?		X
1 to 4 months?		X
4 to 12 months?		X

16. Where will you accept a job?

	YES	NO
Washington, D.C.	X	
Any place in the United States.		X
Outside of the United States.		X
Only in (specify):		

17. Will you accept less than full time work? (Less than 40 hours per week) [ ] Yes [X] No

18. Are you willing to travel? (Check one)

NO	SOME	OFTEN
	X	

19. VETERAN PREFERENCE. Answer all parts. If a part does not apply to you, answer "No."

	Yes	No
A. Have you ever served on active duty in the United States military service? (Exclude tours of active duty for training as a reservist or Guardsman.)		
B. Have you ever been discharged from the armed services under other than honorable conditions? (You may omit any such discharge changed to honorable by a Discharge Review Board or similar authority.) If "Yes," give details in Item 37.		
C. Do you claim 5-point preference based on active duty in the armed forces? If "Yes," you will be required to furnish records to support your claim at the time you are appointed.		
D. Do you claim 10-point preference? If "Yes," check type of preference claimed and complete and attach Standard Form 15, "Claim for 10-point Veteran Preference," together with the proof called for in that form. TYPE: [ ] Compensable disability [ ] Disability [ ] Wife [ ] Widow [ ] Mother		

E. List Dates, Branch, and Serial or Service Number of All Active Service (Enter "N/A" if not applicable)

From	To	Branch of Service	Serial or Service Number
Oct. 22, 1942	Dec. 3, 1945	Air Force	19140 597

DO NOT WRITE IN THIS BLOCK
FOR USE OF EXAMINING OFFICE ONLY

	Material	Entered Register:
[ ] Appot.	[ ] Submitted	
[ ] Nonappor.	[ ] Returned	

ANNOUNCEMENT NO.

Nominations:

Form Reviewed:

Form Approved:

Option	Grade	Earned Rating	Preference	Aug. Rating
			[ ] 5 points (Tent.)	
			[ ] 10 Points Comp. Dis.	
			[ ] Other 10 Points	
			[ ] Disal.	
			[ ] Being Investigated	
Initials and Date				

STATEMENT NO.

THIS SPACE FOR USE OF APPOINTING OFFICER ONLY

Preference has been verified through proof that the separation was under honorable conditions, and other proof as required.

[ ] 5-Pt. [ ] 10-Pt. Comp. Disab. [ ] 10-Pt. Other

Signature and Title

Agency Date

[ ] Refer for medical action

THE FEDERAL GOVERNMENT IS AN EQUAL OPPORTUNITY EMPLOYER

EX 4

Standard Form 171
September 1971 U.S. Civil Ser

USE TYPEWRITER - PARENTHETICAL NOTATIONS INDICATE EXACT OR MAXIMUM NUMBER OF CHARACTERS REQUIRED IN EACH ITEM.

1. APPOINTMENT STATUS (2)	2. REGISTRATION BASIC	2. REGISTRATION CHANGE	3. SOC SEC ACCT NO. (9)	4. NAME (Last, First, Middle Initial)
CS	X		[redacted]	GOLDEN ROBERT NMI

5. CAREER PROGRAM CODE (2)	6. AGCY-S.O.N. - SVCD CODES (8)	7. SEX (M or F) (1)	8. YEAR OF BIRTH (2)	9. MARITAL STATUS (M or S) (1)	10. NO. OF DEPENDENTS (1)
18	HS 2574 HS	[redacted]	[redacted]		

11. VET PREFERENCE (1)	12. SVC CMPT DATE (Mo-Day-Yr) (6)	13. EDUCATION CODE (1)	14. HIGHEST GRADE EVER HELD (3)	15. DATE ENTERED CURR GR (Mo-Yr)(4)	16. DATE INITIALLY ASGD OS (Mo-Yr)(4)
1	12 03 45	8	G11	0576	00 00

17. PRIMARY SPECIALTY (Abbreviate) (Max 12)	18. SECONDARY SPECIALTY (Abbr) (Max 12)	19. TERTIARY SPECIALTY (Abbr) (Max 12)
RAD PHYS	NUC MED PHYS	HLTH PHYS

20. EXPERIENCE: Working back from present, list in date order the last six distinctly separate positions held whether in government, industry or military service. Positions should not be listed separately unless they are characterized by differences in grade, major duties, employing office or experience code.

a. FROM (Mo-Yr)(4)	b. TO (Mo-Yr) (4)	c. SERIES (4)	d. GRADE (3)	e. POSITION TITLE (Abbreviate) (Max 20)	f. EMPLOYING OFFICE & LOCATION (Max 20)
0576	1176	1510	G13	RADIATION PHYSICIST	WRAMC

g. EXPERIENCE CODE(7): 334 | 14 | 0 | 7

h. DESCRIPTION OF WORK

Radiological physics, planning, supervision, execution of radiation therapy physics program.

a. FROM (Mo-Yr) (4)	b. TO (Mo-Yr) (4)	c. SERIES (4)	d. GRADE (3)	e. POSITION TITLE (Abbreviate) (Max 20)	f. EMPLOYING OFFICE & LOCATION (Max 20)
1172	0576	0000	000	RADIATION PHYSICIST	Youngstown Hosp Assoc Oh

g. EXPERIENCE CODE(7): 334 | 14 | 0 | 7

h. DESCRIPTION OF WORK

General radiological physics, planning and execution of physics in radiation therapy, diagnostic x-rays, nuclear medicine, radiation protection.

a. FROM (Mo-Yr) (4)	b. TO (Mo-Yr) (4)	c. SERIES (4)	d. GRADE (3)	e. POSITION TITLE (Abbreviate) (Max 20)	f. EMPLOYING OFFICE & LOCATION (Max 20)
0768	1172	0000	000	ASSISTANT IN PHYSICS	ANDERSON HOSP HOUSTON TX

g. EXPERIENCE CODE(7): 334 | 14 | 0 | 7

h. DESCRIPTION OF WORK

Associate director of radiological physics center. Planned programs, supervised personnel and actively participated in programs designed to test the ability of radiation therapy departments to deliver the prescribed treatment dose to patients.

a. FROM (Mo-Yr) (4)	b. TO (Mo-Yr) (4)	c. SERIES (4)	d. GRADE (3)	e. POSITION TITLE (Abbreviate) (Max 20)	f. EMPLOYING OFFICE & LOCATION (Max 20)
0766	0768	0000	000	RADIOLOGIC PHYSICIST	UNIV HOSP CLEVELAND OHIO

g. EXPERIENCE CODE(7): 334 | 14 | 0 | 7

h. DESCRIPTION OF WORK

General radiologic physics service work and research in radiation therapy.

a. FROM (Mo-Yr) (4)	b. TO (Mo-Yr) (4)	c. SERIES (4)	d. GRADE (3)	e. POSITION TITLE (Abbreviate) (Max 20)	f. EMPLOYING OFFICE & LOCATION (Max 20)
0162	0766	0000	000	RADIATION SAFETY OFFCR	U. COLO MED CTR DENVER CO

g. EXPERIENCE CODE(7): 334 | 14 | 0 | 7

h. DESCRIPTION OF WORK

Operated radiation protection program for medical and research laboratories. Functioned as assistant physicist in radiation therapy. Was masters degree student.

a. FROM (Mo-Yr) (4)	b. TO (Mo-Yr) (4)	c. SERIES (4)	d. GRADE (3)	e. POSITION TITLE (Abbreviate) (Max 20)	f. EMPLOYING OFFICE & LOCATION (Max 20)
0750	0162	0000	000	PHYSICIST	USNRDL SAN FRANCISCO CA

g. EXPERIENCE CODE(7): 334 | 14 | 0 | 7

h. DESCRIPTION OF WORK

Research in radiation dosimetry in radiological physics group. Measured radiations of alpha rays, beta rays, gamma rays, x-rays, neutrons. Calibrated radiation producin and radiation detecting equipment.

VAILABILITY: Indication of availability will not be considered as a commitment but should reflect a genuine interest. Employee will be onsidered only for areas in which he indicates availability.

Indicate availability by checking either "A" or "B" below. In addition, if "B" is checked, identify specific areas of availability by recording "P" or "D" in appropriate boxes below states and countries listed. Use "P" to indicate availability for promotion only and "D" for developmental assignment (*in grade*) or promotion. Employees available only within limits of present commuting area must enter "P" or "D" under the state or country which includes the area.

a. ☐ NOT AVAILABLE b. ☒ AVAILABLE AS INDICATED BELOW.

WASHINGTON 15	OREGON 16	IDAHO 17	MONTANA 20	WYOMING 21	CALIFORNIA 22	NEVADA 23	UTAH 24	ARIZONA 25	COLORADO 26	NEBRASKA 27	KANSAS 28	IOWA 29	MISSOURI 30	N. DAKOTA 31	S. DAKOTA 32	MINNESOTA 33	WISCONSIN 34	MICHIGAN 35	NEW MEXICO 36	TEXAS 37	OKLAHOMA 38	ARKANSAS 39	LOUISIANA 40	ILLINOIS 41	INDIANA 42	KENTUCKY 43	OHIO 44	TENNESSEE 45	ALABAMA 46	MISSISSIPPI 47	GEORGIA 48

N. CAROLINA 50	S. CAROLINA 51	FLORIDA 52	W. VIRGINIA 53	VA (Outside Wash. Area) 54	DC, MD, VA (Wash. Area) 55	DELAWARE 56	WASH. DC (Met Area) 57	PENNA 58	NEW JERSEY 59	NEW YORK 60	CONNECTICUT 61	RHODE ISLAND 62	NEW HAMP 63	VERMONT 64	MAINE 65	MASS 66	GERMANY 67	ITALY 68	ENGLAND 69	JAPAN 70	OKINAWA 71	KOREA 72	PANAMA 73	PHILIPPINES 74	ALASKA 75	HAWAII 76	VIET NAM 77	THAILAND 78	BELGIUM 79	80
					X																									

EDUCATION (*Show only formal education beyond high school.*)

M (4)	TO (Mo-Yr) (4) b	SEM HR (4) c	DEGREE (3) d	MAJOR (Minor) (Max 20) e	SCHOOL & LOCATION (City & State) (Max 20) f
5		0016	NNN	CHEMISTRY, MATH	SAN FRANCISCO JR COLL, CA
5		0130	XAB	PHYSICS, MATH.	UNIV CALIF BERKELEY, CA
9		0003	NNN	PHYSICS	S.F. STATE UNIV SF, CA
2		0035	XMA	RAD PHYSICS	CU MED CTR DENVER, COLO
0		0002	NNN	RAD PHYSICS	ANDERSON HOSP HOUSTON, TX
5		0002	NNN	DIAG PHYSICS	AAPM SUMMER SCHOOL TX

OTHER TRAINING AND SELF DEVELOPMENT (*Include Army sponsored courses.*)

M (4)	TO (Mo-Yr) (4) b	DAYS (4) c		COURSE TITLE OR SUBJECT OF SELF-DEVELOPMENT ACTIVITY (Max 20) d	LOCATION (City & State) (Max 20) e
5	0376	0001		X-RAY QUALITY CONTROL	MADISON, WISC
5	1076	0005		GOVT MGMT SEMINAR II	SILVER SPRING, MD

SPECIAL SKILLS, ACCOMPLISHMENTS, LICENSES, AND CERTIFICATES

M (4)	TO (Mo-Yr) (4) b		KIND OF SKILL, LICENSE, ETC., OR SUBJECT OF ACCOMPLISHMENT (Max 20) c	LOCATION (City & State) (Max 20) d
0	0670		CERTIF. RAD PHYSICS ACR	ATLANTIC CITY, NJ

AWARDS AND RECOGNITION

E (4)		KIND OF AWARD OR NATURE OF ACHIEVEMENT (Max 20) b	AWARDING AGENCY & LOCATION (City and State) (Max 20) c
5		Patent No. 3867638	PATENT OFFICE WASH. DC

STATEMENT OF EMPLOYEE: THE INFORMATION I HAVE FURNISHED ON THIS FORM IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF AND HAS BEEN SUBMITTED IN GOOD FAITH.	DATE 11-8-76	SIGNATURE OF EMPLOYEE Robert Gibbons

REVIEW BY CIVILIAN PERSONNEL OFFICE: THIS COMPLETED FORM HAS BEEN REVIEWED BY THE UNDERSIGNED. ALL INFORMATION APPEARS TO BE COMPLETE AND ACCURATE AND HAS BEEN REPORTED IN ACCORDANCE WITH APPLICABLE INSTRUCTIONS AND REGULATIONS.

Nov 76	TITLE OF PERSONNEL SPECIALIST Personnel Staff Spec	SIGNATURE Andrew W. Kennedy

* U.S. GOVERNMENT PRINTING OFFICE: 1976 O—214-395

Professional Activities

American Association of Physicists in Medicine

National - Observer, Ethics Committee, 1978.
- Member, task group, (recently inactivated) of computer applications committee, 1976.
- Member Task Group, Phantoms in Nuclear Medicine (Thyroid) 1974

Local - Penn-Ohio Chapter: Secretary 1972 - 1976.
Penn-Ohio Chapter, Co-organizer, Mid-East Center for Radiological Physics, 1974.
Organized Symposium on C.A.T. Scanning, 1975.
President-Elect, 1976.
Mid-Atlantic Chapter: Membership Committee, chairman, 1978.

Health Physics Society

National - Public Information Committee, member 1972.
Local - Western Pa. Chapter, 1972 - 1976.
- Baltimore-Washington Chapter, 1976 -

Awards

1977 July 25 Outstanding, WRAMC.

CURRICULUM VITAE

NAME: CORLEY, James Hale

DATE AND PLACE OF BIRTH: [redacted]

WIFE'S NAME: [redacted]

MILITARY SERVICE: October 3, 1970 to present

Ex 6

ACADEMIC AND PROFESSIONAL EDUCATION:

	University of Georgia, B.S. Pharmacy
	University of Georgia, M.S. Hospital Pharmacy
Oct 1970-Dec 1970	AMEDD Officer's Basic Course
Jan 1977-Jun 1977	AMEDD Officer's Advanced Course
Sept 1975-Dec 1976	Hospital Pharmacy Residency, ASHP approved, Fitzsimons Army Medical Center
March 1971	AMEDD Advanced techniques in Hospital Pharmacy
May 1971	AMEDD Army Pharmaceutical Service Management Course
May 1973	AMEDD Army Pharmaceutical Service Management Course
April 1974	AMEDD Nuclear Pharmacy Orientation Course
Sept 1976	AMEDD Army Pharmaceutical Service Management Course

PROFESSIONAL LICENSE: Registered Pharmacist, Certificate #9908 State of Georgia, March 1970

Registered Pharmacy Preceptor, State of Idaho, July 1972

PROFESSIONAL SOCIETIES: American Pharmaceutical Association

American Society of Hospital Pharmacists

BIBLIOGRAPHY:

Corley, J.H., Needham, T.E., Sumner, E.D. and Mikeal, R. Effect of Various Factors on the Amount of Plasticizer in Intravenous Solutions Packaged in Flexible Bags. American Journal of Hospital Pharmacy, 34:259-264 (March 1977).

T.E. Needham, and Corley, J.H. Plasticizer Delivered from Polyvinyl Chloride Intravenous Bags. The New England Journal of Medicine, 294: 398, 1976.

PROFESSIONAL EXPERIENCE:

1977-Present — Radiopharmacist, Nuclear Medicine Service, Department of Radiology, Walter Reed Army Medical Center. Duties include supervision, preparation, dose calculation, dispensing and quality control of radiopharmaceuticals. Assist in the training of Nuclear Medicine technologists and Nuclear Medicine residents. Provide the medical staff with information as to dose, availability, and pharmacology of selected therapeutic agents available from Pharmacy Service, Walter Reed Army Medical Center.

1976-1977 — Attended and graduated from AMEDD Officer's Advanced Course.

1975-1976 — Completed an American Society of Hospital Pharmacist's approved Hospital Pharmacy Residency at Fitzsimons Army Medical Center. This residency included rotations through the various hospital departments, i.e. Dept of Medicine, Surgery, etc. with emphasis on Nuclear Medicine Operations. Also included in this program were various administrative duties such as preparation of a manpower survey (Schedule X), preparation of a computerized pharmacy formulary and establishment of an investigational drug control system.

Completed requirements for a Master's Degree in Hospital Pharmacy from the University of Georgia with emphasis on Biopharmaceutics, Pharmacokinetics, Advanced Physical Pharmacy, Sterile Products preparation and Quality Control and a thesis on the amount of plasticizer found in intravenous solutions packaged in flexible polyvinyl chloride plastic bags.

1970-1974 — Assistant Chief, Pharmacy Service, Walter Reed Army Medical Center. Duties included supervision of in-patient and out-patient pharmaceutical services, implementation of a hospital-wide intravenous admixture service, planning for the new Walter Reed Hospital and Radiopharmacy training under LTC George Dunson, MSC and at the AMEDD Nuclear Pharmacy Orientation Course. Upon departure from WRAMC, received the Army Commendation Medal.

1969-1970 Pharmacy Internship completed at Glynn-Brunswick Memorial Hospital, Brunswick, Georgia. Passed the Georgia State Board of Pharmacy examination and received Registered Pharmacist license. Worked as a staff pharmacist at Glynn-Brunswick Memorial Hospital until entry on active duty in October 1970. AMEDD Officer's Basic Course completed December 1970.

CURRICULUM VITAE

NAME: Dennis A. Stevenson
CPT, MSC
SSAN:

Current Duty Assignment: Assistant Health Physics Officer
Chief, Nuclear Lab and Technical Services Branch
Health Physics Office
Walter Reed Army Medical Center

EX 6

Home Address:
Legal Residence
Date of Birth:
Place of Birth:

EDUCATION:

Ph.D.	Physics (Biophysics)	University of Delaware Newark, Delaware 19711
M.S.	Physics (Biophysics)	University of Delaware Newark, Delaware 19711
B.A.	Physics	Gettysburg College Gettysburg, PA

EXPERIENCE:

1977 - Walter Reed Army Medical Center
Assistant Health Physics Officer
Chief, Nuclear Lab and Technical Services Branch

1977 AMEDD Officer Basic MSC Course 6-8-C20
Class #1, Ft. Sam Houston, Texas

1973 - 1977 Assistant Professor of Physics
Northeast Louisiana University
Monroe, Louisiana 71209
(Radiation Safety Officer - 1976 to 1977)

1972 - 1973 Research Associate
Department of Biophysics and Microbiology
University of Pittsburgh, Pittsburgh, PA

Physical studies of Tobacco Mosaic Virus (TMV), polymerization-depolymerization of TMV protein, and the reconstitution of the component proteins and nucleic acid into a virus particle. These studies involved the use of the following techniques: electrophoresis, acid-base titration, ultracentrifugation, spectroscopy, electron microscopy, and radioisotopes.

1966 - 1972	Graduate Student Department of Physics University of Delaware Newark, Delaware 19711
	Teaching Assistant - Taught basic physics recitation sections and laboratories. Research Fellow - Research projects were in the field of biophysics and involved the effect of ionizing radiation and temperature on molecular interactions.
Summers 1966 1965	Physicist Aberdeen Proving Ground, MD
	A study of atmospheric turbulence using the propagation of a laser beam through the atmosphere.

ADDITIONAL RELEVANT EXPERIENCE:

1976 - 1977	Radiation Safety Officer Northeast Louisiana University Monroe, Louisiana 71209
1973 - 1977	Designed and taught an x-ray physics class for radiologic technicians in training at several local hospitals. The course included physical and clinical aspects of x-ray technology. (2 semester course).
1974 - 1977	Designed and taught a graduate-undergraduate level biophysics course. The course involved a study of the physical properties of large biologically important molecules and the application of the concepts and techniques of physics in the study of biological systems.
1977	Designed and taught a graduate level biophysics laboratory course. The course included spectroscopy, radionuclide techniques, radiation effects and electron microscopy.
1974	Designed and taught a special graduate level course for state public health personnel working toward a graduate degree in biology. The course included the physical study of ionizing radiation and its effect on biological systems from the cellular level to man as well as the instruments used to detect and monitor these radiations.

1975 - 1977	Director of NSF sponsored program entitled "Selected Biomedical Applications of Physics" for outstanding high school juniors from throughout U.S.A.

OTHER EDUCATION AND TRAINING:

1973	NSF Chataqua Short Course: Biophysical Transport Phenomena
1974	Biomedical Aspects of Environmental Pollution Course, Oak Ridge, TN
1976	External Beam, Interstitial and Intercavitary Dosimetry - Principles Course The University of Texas Health Science Center at Houston MD Anderson Hospital and Tumor Institute Houston, Texas
1976	External Beam, Interstitial and Intercavitary Dosimetry - Manual and Computer Methods of Calculation The University of Texas Health Science Center at Houston MD Anderson Hospital and Tumor Institute Houston, Texas
1977	AMEDD Officer Basic MSC Course Fort Sam Houston, Texas
1978	The Medical Effects of Nuclear Weapons Course AFFRI - DNA
1978	Laser and Microwave Hazards Course US Army Environmental Hygiene Agency Aberdeen Proving Ground, Maryland
1978	Medical X-Ray Survey Techniques Course Academy of Health Sciences Fort Sam Houston, Texas
1978	Nuclear Emergency Training Exercise (NETEX) Interservice Nuclear Weapons School Kirtland AFB, New Mexico
1978	Nuclear Hazards Training Course (NHTC) Interservice Nuclear Weapons School Kirtland AFB, New Mexico

'BLICATIONS:

Ph.D. Thesis
"The Influence of Temperature on Globular Protein-Polyribonucleotide Interactions"

M.S. Thesis
"The Effect of Damaged Proteins on the Light Scattering Properties of Ribonucleic Acid Solutions- A Comparison of Ultraviolet and Ionizing Radiation Effects"

Preiss, John W. and Dennis A. Stevenson, "Some Parallelisms in the Behavior of Pancreatic Ribonuclease and Chicken Lysozyme Toward Homopolyribonucleotides", Biophysical Journal, 12, p.80 (1972)

Stevenson, Dennis A. and John W. Preiss, "Temperature Variation of Polyribonucleotide Conformation by an Interaction with Basic Globular Proteins", Biophysical Journal, 13, p.470 (1973)

Shugart, Cecil G., Ronald E. Smith, Larry D. Johnson, John H. Myers, and Dennis A. Stevenson. 1975. Physical Science Lab Manual. Kendall/Hunt Pub. Co., Iowa.

Stevenson, Dennis A., "Biophysics of the Eye" The Louisiana Physics Teacher, 5, p.2 (1975)

EMBERSHIP:

Biophysical Society
The American Physical Society
American Association for the Advancement of Science
Sigma Xi - The Scientific Research Society of North America
Sigma Pi Sigma - National Physics Honor Society

DEPARTMENT OF THE ARMY
WALTER REED ARMY MEDICAL CENTER
WASHINGTON, D.C. 20012

REPLY TO
ATTENTION OF:

CURRICULUM VITAE January 16, 1979

of

JOHN C. CRAWFORD, COLONEL, [redacted] Ex 6

DATE AND PLACE OF BIRTH:

YEARS OF ACTIVE SERVICE: Over 22

BASIC BRANCH: Medical Service Corps

PRESENT ASSIGNMENT: Director, Industrial Operations, Walter Reed Army Medical Center, Wahsington, D.C.

MILITARY SCHOOLS ATTENDED:
The Armored School, Basic Officers Course
The Armored School, Communications Officers Course
The AMEDD Officers Medical Materiel Course
The AMEDD Officers Advanced Course
The Department of Defense Military Assistance Institute

EDUCATIONAL DEGREES:
Central State University-BS Degree Biology
Baylor University-MHA-Hospital Administration

MAJOR DUTY ASSIGNMENTS (last 18 years)
Medical Advisor, US Training Mission to Saudia Arabia
Commanding Officer, 47th Medical Depot, 3rd US Army
Assistant Military Attache, US Embassy, Laos
Hospital Administrator Advisor to the Agency for International Development, US Embassy, Laos
Inspector General, US Army Health Services Command
Chief, Logistics Division, US Army Medical Command Korea/US Army Hospital Seoul

AWARDS AND DECORATIONS:
Legion of Merit
Meritorious Service Medal with First Oak Leaf Cluster

SOURCE OF COMMISSION:
ROTC

MICHAEL J. BOSWORTH

EDUCATION: Juris Doctor Degree,
Loyola University School of Law, New Orleans, Louisiana
Member of moot court team. Elected officer of Delta Theta Phi Legal Fraternity. Awarded Certificate of Merit for service as writer for The Code.

B.A. Degree Political Science, June
Loyola University, New Orleans, Louisiana

Ex 6

United States Army Judge Advocate General's School
University of Virginia, Charlottesville, Virginia
Basic Course, 1974.
Management for Military Lawyers, 1975.

Short Course for Defense Lawyers in Criminal Cases, 1976
Northwestern University, Chicago, Illinois

Armed Forces Institute of Pathology, Washington, D. C.
Medical Legal Symposium, 1978.
Basic Forensic Pathology, 1978.

EXPERIENCE: 1. General attorney assigned to Walter Reed Army Medical Center. Duties include administrative and tort law.

2. Trial attorney for Rish and Associates, Lexington, South Carolina. This firm litigates a high volume of civil and criminal cases. Duties included the preparation of pleadings, taking of depositions and trial of cases.

3. Attorney for Army Judge Advocate General's Corps In 1974, assigned to Office of the Staff Judge Advocate, Fort Jackson, South Carolina. Duties included:

a. Legal Assistance Officer counselling clients on problems concerning personal injury, domestic relations, adoptions, trusts, wills, real estate, taxation, citizenship, contracts and personal finances. Legal research and drafts of legal documents were essential elements of this position

b. Senior Defense Counsel representing clients on a wide variety of criminal matters. This position demanded a strong capability to litigate cases at trial and before administrative boards. These duties included management of professional and clerical personnel. Awarded Army Commendation Medal in 1977.

4. Legal consultant, Mayor's Office of Consumer Affairs, New Orleans, Louisiana, 1973. Assisted in drafting proposed state and local consumer protection legislation and acted as staff advisor.

NAME IN FULL: FRANKLIN HENRY TOP, JR.

RANK, CORPS, COMPONENT: COL, Medical Corps, USA

SSAN: [redacted]

DOB: [redacted]

DATE ENTERED ACTIVE DUTY: 1 Aug 66 DATE PRESENT RANK: 10 Dec 74

TOTAL YEARS MILITARY SERVICE: 10 DATE PERMANENT RANK: 10 Jun 71

WIFE'S NAME: [redacted]

CHILDREN'S NAME(S) AND AGES: [redacted]

Ex 6

EDUCATION - MILITARY, CIVILIAN, DATE, DEGREE, SCHOOLS:

BS, Yale University
MD, Yale University
Pediatric internship, University of Minnesota Hospital, 1961-1962
Pediatric residency, University of Minnesota Hospital, 1962-1962
Basic course, Medical Field Service School, Fort Sam Houston, TX, 1966

MILITARY ASSIGNMENTS (IN ORDER; INCLUDE TITLE OF JOB):

Internist, Dept of Virus Diseases, DCD&I, WRAIR, 1966-1968
Assistant Chief, Dept of Virus Diseases, DCD&I, WRAIR, 1968-1970
Chief, Dept of Virology (SEATO), 1972-1973
Chief, Pediatric Training Program (SEATO), 1972-1973
Deputy Director, U.S. Army Medical Component, SEATO, 1972-1973
Chief, Dept of Virus Diseases, DCD&I, WRAIR, 1973-1976
Director, Div of Communicable Disease and Immunology, WRAIR, 1976-

MILITARY AWARDS, HONORS, BADGES:

Meritorious Service Medal

MEMBERSHIP, SCIENTIFIC COMMITTEES:

Member, Infectious Disease Committee, National Institute of Allergy and Infectious Diseases, NIH, 1976-1980
Member, Policy Board of Transfusion Transmitted Virus Study, National Heart and Lung Institute, NIH, 1974 to present
USAMRDC Liaison representative to Committee on Viral Hepatitis, National Research Council, 1974 to present

PROFESSIONAL SOCIETIES

Certified, American Board of Pediatrics, 1966
Society for Pediatric Research
The American Society of Tropical Medicine and Hygiene
American Society for Microbiology
Infectious Disease Society of America
American Association of Immunologists

MISCELLANEOUS (INCLUDE HOBBIES, SPECIAL INTERESTS)

--

PUBLICATIONS: See attached

1. TOP, F.H., Jr., L.W. Wannamaker, W.R. Maxted, and B.F. Anthony. M Antigens among Group A Streptococci Isolated from Skin Lesions. J Exp Med 126:667-635, 1967

2. TOP, F.H., Jr., and L.W. Wannamaker. The Serum Opacity Reaction of Streptococcus pyogenes: Frequency of Production of Streptococcal Lipoproteinase by Strains of Different Serologic Types and the Relationship to M Protein Production. J Hyg Camb 66:49-58, 1968

3. TOP, F.H., Jr., and L.W. Wannamaker. The Serum Opacity Reaction of Streptococcus pyogenes: The Demonstration of Multiple, Strain-specific Lipoproteinase Antigens. J Exp Med 127:1013-1034

4. TOP, F.H., Jr., and F.H. Top, Sr. Rubella in F.H. Top, Sr. (ed.). Communicable and Infectious Diseases, Sixth Edition, C.V. Mosby, St. Louis 1968, pp 506-512

5. URIZAR, R.E., A. Schwartz, F.H. Top, Jr., and R.L. Vernier. The Nephrotic Syndrome in Children with Diabetes mellitus of Recent Origin, NEJM 281:174-181, 1969

6. ALTEMEIER, W.A., F.K. Mundon, F.H. Top, Jr., and P.K. Russell. Method for Extracting Viral Hemagglutinin Inhibiting Antibodies from the Non-specific Inhibitors of Serum. Applied Microbiology 19:785-790, 1970

7. SMITH, T.J., E.L. BUESCHER, F.H. Top, Jr, W.A. Altemeier, and J.M. McCown. Experimental Respiratory Infection with Type 4 Adenovirus Vaccine in Volunteers: Clinical and Immunological Responses, J Inf Dis 122:239-248, 1970

8. TOP, F.H., Jr., R.A. Grossman, P.J. Bartelloni, H.G. Segal, B.A. Dudding, P.K. Russell, and E.L. Buescher. Immunization by Selective Intestinal Infection with Adenovirus Type 7: Tests for Safety Infectivity, Antigenicity and Potency in Volunteers. J Inf Dis 124:148, 1971

9. TOP, F.H., Jr., E.L. Buescher, W.H. Bancroft, and P.K. Russell. Immunization with Live Types 7 and 4 Adenovirus Vaccines: II. Antibody Response and Protective Effect Against Acute Respiratory Disease Due to Adenovirus Type 7. J Inf Dis 124:155-160, 1971

10. TOP, F.H., Jr., B.A. Dudding, P.K. Russell, and E.L. Buescher. Control of Respiratory Disease in Recruits with Type 4 and 7 Adenovirus Vaccines. Am J Epid 94:142-146, 1971

11. KAPLAN, E.L., F.H. Top, Jr., B.A. Dudding, and L.W. Wannamaker. Diagnosis of Streptococcal Pharyngitis; The Problem of Differentiating Active Infection from the Carrier State in the Symptomatic Child. J Inf Dis 123:490-501, 1971

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12. Buescher, E.L., F.H. Top, Jr., B.A. Dudding, and P. K. Russell. Cost Benefit Analysis of Military Adenovirus Vaccines. Proceedings, International Conference on the Application of Vaccines against Viral, Rickettsial, and Bacterial Diseases of Man, PAHO, Scientific Publication 226, 475-476, Washington, D.C., 1971.

13. Dudding, B.A., F.H. Top, Jr., R.M. Scott, P.K. Russell, and E.L. Buescher. An Analysis of Hospitalizations for Acute Respiratory Disease in Recruits Immunized with Adenovirus Type 4 and 7 Vaccines. Am. J. Epidem. 95:140-147, 1972.

14. Dudding, B.A., P. J. Bartelloni, R.M. Scott, F.H. Top, Jr., P.K. Russell, and E.L. Buescher. Enteric Immunization with Live Adenovirus Type 21 Vaccine. I. Tests for Safety, Infectivity, Immunogenicity and Potency in Volunteers. Inf and Immun 5:295-299, 1972

15. Dudding, B.A., S.C. Wagner, J.A. Zeller, J.T. Gmelich, G.R. French, and F.H. Top, Jr. Fatal Pneumonia in Three Military Trainees Associated with Adenovirus Type 7. NEJM 286:1289-1292, 1972

16. Top, F.H., Jr. Rubella in F.H. Top, Sr. (ed). Communicable and Infectious Diseases, Seventh Edition, C.V. Mosby Co., St. Louis, 1972

17. Dudding, B.A., F.H. Top, Jr., P.E. Winter, E.L. Buescher, T.H. Lamson, and A. Liebovitz. Acute Respiratory Disease in Military Trainees; The Adenovirus Surveillance Program, 1966-1971. Am J Epid 97:187-198, 1973

18. Pathogenetic Mechanisms in Dengue Hemorrhagic Fever: Report of an International Collaborative Study. Bull. WHO 48:117-133, 1973

19. Bokisch, V.A., F.H. Top, Jr., P.K. Russell, F.J. Dixon, and H.J. Muller-Eberhard. The Potential Pathogenetic Role of Complement in Dengue Hemorrhagic Shock Syndrome. NEJM 289:996-1001, 1973

20. Top, F.H., Jr., C. Kraivapan, R.A. Grossman, H. Rozmiarek, R. Edelman, and D.J. Gould. Ingwavuma Virus in Thailand; Infection of Domestic Pigs. Am J Trop Med and Hyg 23:251-257, 1974

21. Edelman, R., S. Nimmannitra, R.W. Colman, R.C. Talamo, and F.H. Top, Jr. Evaluation of the Kinin System in Dengue Hemorrhagic Fever. J Lab Clin Med 86:410-421, 1975

22. Grossman, R.A., M.W. Benenson, R.M. Scott, R. Snitbhan, F.H. Top, Jr., and S. Patuwatana. An Epidemiologic Study of Hepatitis B Virus in Bangkok, Thailand. Am J Epid 101:144-159, 1975

23. TOP, F.H., Jr., P. Gunakasem, C. Chantrasri, and J. Supavadee. Serologic Diagnosis of Dengue Hemorrhagic Fever Using Filter Paper Discs and One Dengue Antigen. Southeast Asia J of Trop Med and Pub Hlth 6:18-24, 1975

24. Snitbhan, R., R.M. Scott, W.H. Bancroft, F.H. Top, Jr., and D. Chiewsilp. Subtypes of Hepatitis B Antigen in Southeast Asia. J Inf Dis 131:708-711, 1975

25. Irwin, G.R., A.M. Allen, W.H. Bancroft, J.J. Karwacki, H.L. Brown, R.H. Pinkerton, M. Willhight, and F.H. Top, Jr. Hepatitis B Antigen in Saliva, Urine and Stool. Infect Immunity 11:142-145, 1975

26. Top, F.H., Jr. Control of Adenovirus Acute Respiratory Disease in U.S. Army Trainees. Yale J Biol Med 48:185-195, 1975

27. Benenson, M.W., F.H. Top, Jr., W. Gresso, C.W. Ames, and L.B. Altstatt. The Virulence to Humans of Japanese Encephalitis Virus in Thailand. Am J Trop Med Hyg 24:974-980, 1975

28. Top, F.H., Jr. Rubella in F.H. Top, Sr. and P.F. Wehrle (ed.). Communicable and Infectious Diseases, Eighth Edition, C.V. Mosby Co., St. Louis, 1976

29. Top, F.H., Jr. Adenovirus Infections in N.R. Rose and H. Freedman. Manual of Clinical Immunology, American Society for Microbiology, 1976

30. Parkman, P.D., G.J. Galasso, F.H. Top, Jr., and G.R. Noble. Summary of Clinical Trials of Influenza Vaccines. J Inf Dis 134:100-107, 1976

31. Irwin, G.R., A. M. Allen, H.E. Segal, M. Willhight, H. Cannon, and F.H. Top, Jr. Persistence of Antibody to Hepatitis B Surface Antigen. J Clin Microbiol 3:465-468, 1976

32. Catanzaro, P.J., W.E. Brandt, W.R. Hogrefe, S.M. Phillips, and F.H. Top, Jr. Virus-Enhanced Modulation of Cell-Surface Antigens: Effect of Immune Lytic Susceptibility. J Immunol 117:1104-1110, 1976

33. Williams, J.E., S. Imlarp, F.H. Top, Jr., D.C. Cavanaugh, and P.K. Russell. Kaeng Khoi Virus from Naturally Infected Bedbugs (Cimicidae) and Immature Free-Tailed Bats. Bull WHO 53:365-369, 1976

CURRICULUM VITAE

NAME: BASS, BILLY G. SSAN:

GRADE/STEP: GS 14/8 DATE OF GRADE: August 22, 1967

DATE JOINED WRAIR: July 29, 1962

CURRENT POSITION TITLE: Director

DEPARTMENT:

DIVISION: Instrumentation

DATE OF BIRTH:

HOME ADDRESS: TELEPHONE #:

NAME OF SPOUSE:

CHILDREN'S NAMES: DATE OF BIRTH:

WHOM TO NOTIFY
IN CASE OF EMERGENCY: TELEPHONE #:

Ex 6

EDUCATION

School	Dates attended	Degree(s)	Major
Univ. of Maryland (Overseas Extension)	Jan. 1952-May 1964	none	Liberal arts
N.C. State College	Sept. (-June)	BS Nuc. Eng.	
UCLA	Jan. 1959-June 1961	none	grad. studies E
Univ. Md., Coll. Pk.	Sept. 1962-June, 1964	None	grad. studies E
G.W.U., Wash, D.C.	Sept. (-May)	MS Engineering	Electronics
G.W.U., Wash, D.C.	Sept. (-May)	~~Doctoral Candidate~~ PhD	Elec. Engineering

EXPERIENCE

a. Prior to coming to WRAIR:

Dates	Position
June, 1958 - Jan., 1959	Newport News Shipbuilding & Drydock Co. Nuclear Engineer
Jan., 1959 - July, 1962	Douglas Aircraft Co., Aerospace Div. Electronics Engineer (Radar and microwave systems design, nuclear rocket instrumentation system design)

b. Since coming to WRAIR:

1962 - 1967	Chief, Electronics Sect, Div. Nuc. Med.
1967 - 1970	Chief, Dept. Nucleonics, Div. Nuc. Med.
1970 - 1972	Ass't Chief, Dept. AIA, Div. Biochemistry
1972 - 1976	Chief, Dept. Analytical Chem, Div. Bioche
1976 -	Director, Instrumentation Division

MILITARY SERVICE (If appropriate)

Dates: August, 1950 - June, 1954

Rank: Sgt. (Airman First Class)

Branch: U.S. Air Force

Awards: Good Conduct Medal
Germany Occupation Ribbon

PROFESSIONAL ORGANIZATION MEMBERSHIP (including any offices held)

Institute of Electrical and Electronic Engineers

American Nuclear Society

Association for the Advancement of Medical Instrumentation

AWARDS

Outstanding Performance Award
1964
1967
1971

Certificate of Achievement - WRAIR
1976

MISCELLANEOUS (Hobbies, Special Interests, etc.)

Ex 6

PUBLICATIONS

(COMPLETE CITATION)

1. Bass, B.G., Effects of Particle Radiation on Selected Electronic Components, Douglas Aircraft Company Report A2-260-S/VE-M295, March 2, 1962.

2. Bass, B.G., New Walter Reed Multiple Crystal Whole Body Counter, San Diego Biomedical Engineering Symposium, 16-18 March 1966.

3. Levri, Elvio A., Runyan, Thomas E., Bass B.G., Mahin, D.T., Diagnostic Applications of Neutron Activation Analysis in Medicine, Second International Conference on Medical Physics, August 11-15, 1969.

4. Bass, B.G., Ryan, E.L., Gardner, H.B., Mahin, D.T., The Walter Reed Multiple Crystal Whole Body Counter, Second International Conference on Medical Physics, 11-15 August 1969.

5. Bass, B.G., Plan for the Dismantling of a Research Nuclear Reactor, March, 1970. (Master's Thesis, George Washington University School of Engineering and Applied Science).

6. Bass, B.G., Wisla, S., Miller, V., Health Physics Aspects of Dismantling a Research Nuclear Reactor, Health Physics Annual Meeting, 15 June 1972.

7. Bass, B.G., Holman, E.C., The Walter Reed Research Reactor Dismantling Project, Transactions of American Nuclear Society, Vol. 15, No. 2, Nov. 1972.

8. Bass, B.G., Use of Excess Weapons System Computers in Biomedical Instrumentation, U.S. Army ADP Symposium, 15 Nov. 1972. (Abstract)

9. Khouri, Edward M., Olsson, Ray A., Bedynek, Julius L., and Bass, Billy G., "An Implantable Semiconductor Beta-radiation Detector," Am. J. Physiol. 323(1), 1977.

ACCOMPLISHMENTS

1962 - 1967 Chief, Electronics Section, Division of Nuclear Medicine, WRAIR

In this position I was responsible for supervising the efforts of 4-6 technicians in the design, development and implementation of unique and sophisticated nuclear medical instrumentation systems for research and clinical use.

Specific Accomplishments

1. Redesigned and renovated and placed back into operation the Walter Reed Whole Body Counter. This was the old 4-pi HUMCO type counter. This counter was then used for two years as a clinical research tool. See Photo. 1.

2. Designed and supervised the construction of the most sophisticated whole body counter in the world (at that time). See photo 2. This system encompassed state-of-the-art developments in low level radiation detector design and configuration, shielding, and data processing capabilities.

3. Designed and supervised the construction of one of the first three-probe renogram systems to be put into clinical practice. See photo 3. This system was the forerunner of a commercial system still in use on the Renal Transplant Ward (38) WRGH for use in early detection of rejection of transplanted kidneys.

4. Designed and directed the construction of one of the first total body scanners to be used in clinical nuclear medicine service. See photo 4. This system differed from conventional scanners of the time in that it was designed to be used in conjunction with an overhead fluoroscipy unit to get both scan and fluoroscopy image of the same subject.

5. Designed a sophisticated cell sizing system using the Coulter transducer and a small special purpose computer (multi channel pulse height analyzer) for storing and displaying the cell volume distributions. This system was used extensively by G. Bahr, AFIP, Bryan Bull, MD, at the Clinical Center, NIH, Merrell C. Johnson, COL, MC, WRGH, and others for various studies of mammalian cell, lymphocyte or bacteria volume distributions. A commercial version of the system is still in operation in the Division of Biochemistry.

6. Studied the computer requirements for the Walter Reed Army Institute of Research and wrote the Data Automation Request (DAR) in accordance with the requirements of AR 1-251 (now AR 18-2) and drafted the technical specifications for a computer facility for the WRAIR. This work resulted in the formation of the Division of Biometrics and Medical Info. Proc., WRAIR, and the acquisition of the CDC 3300 computer.

7. Served on the initial criticality team for the Walter Reed Research Reactor (WRRR). Held Operator's License and Senior Reactor Operator License from the U.S. Atomic Energy Commission for the L-54 nuclear reactor. Designed a transistorized control system for the reactor. Designed numerous instruments and systems for use in the radiobiological research program and for basic research in radiation detection and dosimetry.

1967 - 1970 Served as Chief, Department of Nucleonics, Division of Nuclear Medicine, WRAIR

This department consisted of about 22 professional and technical personnel, the Walter Reed Research Reactor, Walter Reed Whole Body Counting Facility, Automated Instrumental Analysis Laboratory, Neutron Activation Analysis Laboratroy, Radiation Dosimetry Laboratory and Electronics Section.

Specific Accomplishments

1. Served as Technical Director, WRRR.

2. Established with C.R. Angel one of the first neutron activation analysis laboratories dedicated solely to medical problems.

3. Set up one of the first radiopharmaceutical production facilities directly connected with a clinical facility (^{18}F was produced here and used for bone scanning in the Nuclear Medicine Service, WRGH).

4. Served as consultant to St. Luke's Hospital Center in New York City, in nuclear medicine instrumentation.

5. Served as advisor in nuclear instrumentation to Consultant, Nuclear Science, OTSG, DA.

6. Appointed to Reactor Safeguards Committee, U.S. Army Pulse Radiation Facility, Ballistics Research Laboratory, Aberdeen, Md. (still serving)

7. Appointed to Reactor Test Planning Committee, Harry Diamond Laboratory Radiation Facility (DORF) (still serving).

8. Developed a plan for the dismantling of the Walter Reed Research Reactor.

9. Took a Master of Science in Engineering degree from George Washington University through evening study.

1970 - 1972 Served as Assistant Chief, Dept. of Automated Instrumental Analysis, Division of Biochemistry, WRAIR. (Actually, since LTC Angel was Deputy Director, Division of Biochemistry, I was de facto head of the department).

During this period, in addition to many of the aforementioned duties, I planned and directed the defueling, dismantling and decommissioning of the WRRR. This was the first nuclear reactor of this size ever to be completely dismantled. All other reactors of this size, even those on AEC reservations, had only been defueled and partially dismantled or mothballed but none had been dismantled in a building such as the WRAIR. This project was accomplished at less estimated cost, within the projected time and without disruption of normal operations at the WRAIR.

1972 - 1976 Served as Chief, Department of Analytical Chemistry (about 30 professional and technical persons), Div. of Biochemistry, WRAIR

Spent academic year (1972) at George Washington University completing course requirements and qualifying examinations for doctorate in engineering under sponsorship of Dept. of Army long term training grant.

Managed and directed research staff in the development of methods and instrumentation for the assay of drugs of abuse in human tissues and fluids. Directed research project in studying the excretion patterns of methaqualone in humans. A paper authored by Kazyak et. al. resulted from this effort.

Directed the development of a gas chromatographic method for assaying cocaine in human body fluids.

Directed the establishment of a mass specrometry laboratory for use in biomedical research. Several papers on marihuana metabolism in humans have resulted from this effort.

Established and initially directed the technical group that developed the assay methodology for nerve gas and antidote in human fluids.

Course Director for "Advances in Biochemical Instrumentation at WRAIR Jan. - Feb. 1975.

1976 - present Serve as Director, Instrumentation Division

Manage operations of three departments - Glassworking, Metal-Plastics, and Electronics - dedicated to the design and development of unique biomedical instrumentation systems. Serve as consultant in instrumentation science, electronics and nuclear science to the Director, WRAIR and the WRAIR professional and technical staff. Serve as WRAIR Radiation Safety Officer and WRAIR representation on WRAMC Radioisotope Committee. Serve as Chairman, WRAIR Capital Equipment Review Committee.

Perform research in biomedical electronics to develop new applications in military medical research. ~~Have completed academic requirements for~~ Received PhD in Electrical Engineering and Computer Science. Dissertation topic is "correlation of the visual evoked response with regional blood flow, electroencephalogram and extracellular potassium concentrations in the monkey."

CURRICULUM VITAE

DEAN WINSTON GIBSON, Ph.D.
SSAN

Present Position: Research Biophysicist and Electron Microscopist
Department of Infectious and Parasitic Disease Pathology
Armed Forces Institute of Pathology
Washington, D.C. 20306 1970-present
phone: 576-2224

Research Topics: electron microscopy, cytochemistry and histochemistry, onchocerciasis, hepatitis, other infectious & parasitic diseases

Personal Data:
Born:
Home:
Married:

Children:

Education:
Undergraduate: B.A. (mathematics), Kenyon College, Gambier, Ohio, magna cum laude, with Honors in Mathematics; minors in chemistry, physics, and biology; languages--German & Russian

Graduate: Ph.D. (biophysics), Dept. of Biophysics, School of Arts & Sciences, Johns Hopkins University, Baltimore, Md., Thesis: "Gold(III) Reactions with Nucleotides and Polynucleotides" (for electron microscopic studies of nucleic acids)--see Bibliography; Advisor: Professor Michael Beer, Ph.D.

Post-graduate: Post-doctoral research in lab of Professor Russell J. Barrnett, M.D., Chairman, Dept. of Anatomy, Yale Univ. School of Medicine, New Haven, Ct., 1968-1970; research topics--electron microscopic cytochemistry, using gold(III)-nucleotides as substrates--see Bibliography; lecturer in Cell Biology & Histology course, and instructor of histology laboratory for medical students

Employment:
Research biophysicist, Dept. of Infectious and Parasitic Disease Pathology, Armed Forces Institute of Pathology, Washington, D.C. 20306 (576-2224); 1970-present.

Researcher on onchocerciasis and hepatitis--histochemical and electron microscopic studies on onchocercal dermatitis and lymphadenitis, and on treatment with diethylcarbamazine and suramin (see bibliography).

Member of "USAID Liberia/Oncho. Team", Nov-Dec 1978--team of consultants surveying onchocerciasis in Lofa, Bong and Nimba Counties, Liberia; for the U.S. Agency for International Development; resulting from agreement between Liberian President Tolbert and U.S. President Carter, spring 1978.

Case-Officer-of-the-Day on a rotating basis (about once a week); responsible for histopathologic studies of cases accessioned that day to the Dept. of Infectious & Parasitic Disease Pathology.

AFIP Representative on WRAMC Radioisotope Committee (1972-Present); instructor, WRAMC Advanced Radioisotope Users Course (1973-74).

Professional Societies, Fraternities and Clubs:

American Association for the Advancement of Science
American Society of Tropical Medicine and Hygiene
Biophysical Society
Cosmos Club (Washington, D.C.)
Histochemical Society
Sigma Xi (Honorary Scientific Fraternity)

Community & Civic Activities:

Bibliography--Dean W. Gibson and coauthors:

Beer, M., Gibson, D.W., and Mohlhenrich, K.H.: "The Selective Reactions of Chloroauric Acid with the Nucleotides," Biophys. Soc. Abstr. MB1, 1963.

Gibson, D.W. and Beer, M.: "Some Reactions of Nucletoides with Gold(III) Ions, with Coupling of Thallium(I)-aspartate," Ibid., A175, 1968.

Gibson, D.W.: "Gold(III) Reactions with Nucleotides and Polynucleotides," Ph.D. Dissertation, The Johns Hopkins University, Baltimore, Maryland; 177 pages, 1969; Dissertation Abstracts 30 (2), 513-B, 1969.

Beer, M., Gibson, D.W., and Koller, T.: "Some Metal Ion DNA Reactions of Interest in Electron Microscopy," in Effects of Metals on Cells, Subcellular Elements, and Macromolecules (J. Maniloff, J.R. Coleman, and M.W. Miller, Eds.), C.C. Thomas (Publishers), Springfield, Ill. pages 131-151, 1970.

Ex 6

Fitzsimons, J.T.R., Gibson, D.W., and Barrnett, R.J.: "A New One-Step Method for the Fine Structural Localization of Acid Phosphatase," J. Histochem. Cytochem. 18, 673, 1970.

Gibson, D.W., Beer, M., and Barrnett, R.J.: "Gold(III) Complexes of Adenine Nucletoides," Biochemistry 10, 3669-2678, 1971.

Gibson, D.W., Connor, D.H., et al.: "Onchocercal Dermatitis: Ultrastructural Studies of Microfilariae and Host Tissues, Before and After Treatment with Diethylcarbamazine (Hetrazan®)," Amer. J. Trop. Med. Hyg. 25, 74-87, 1976.

Gibson, D.W., Duke, B.O.L., and Connor, D.H.: "Histopathological Studies on Suramin Toxicity in a Chimpanzee, Tropenmedizin und Parasitologie 28, 387-405, 1977.

Gibson, D.W., and Connor, D.H.: "Onchocercal Lymphadenitis: Clinicopathologic Study of 34 Patients," Trans. R. Soc. Trop. Med. Hyg. 72, 137-154, 1978.

Connor, D.H. and Gibson, D.W.: "Sowda--Onchocercal Dermatitis in the Yemen Arab Republic: Clinicopathologic Study of 17 Patients," Arch. Pathol. Lab. Med., 1979 (in preparation).

Connor, D.H., and Gibson, D.W.: "Onchocercal Dermatitis in the Republic of Liberia: Clinicopathologic Study of Topical Treatment with Diethylcarbamazine", Pathology Annual, 1979-80 (in preparation).

Additional references based on direct contributions of D.W. Gibson:

Highton, P.J., and Beer, M.: "The Minimum Mass Detectable by Electron Microscopy," J. Roy. Micr. Soc. 88, 23-38, 1968; (electron microscopic visualization of gold(III)-polyadenylic acid, prepared by reaction of Gibson, 1969 and Gibson, Beer & Barrnett, 1971).

Feinstone, S.M., Kapikian, A.Z., and Purcell, R.H.: "Hepatitis A: Detection by Immune Electron Microscopy of a Virus-Like Antigen Association with Acute Illness," Science 182, 1026-1028, 1973; (Gibson supplied acute saline fecal extracts and convalescent sera from Hepatitis A volunteers, for this first detection of Hepatitis A antigen and antibody).

Dienstag, J.L., Alling, D.W., and Purcell, R.H.: "Quantitation of Antibody to Hepatitis A Antigen by Immune Electron Microscopy," Infection and Immunity 13, 1209-1213, 1976; (Gibson supplied fecal extracts and sera from Hepatitis A volunteers, as for Feinstone et al, 1973).

DAVID SCOTT HARTMAN

CURRICULUM VITAE

Date and Place of Birth: [redacted]

Citizenship: [redacted]

Married: [redacted]

Children: [redacted]

Ex 6

Secondary School: Hueneme High School
Oxnard, California - [redacted]

Graduate Education: Bachelor of Arts, Zoology,
with high honors
University of California, Santa Barbara
Santa Barbara, California

Medical Education: M.D. Degree University of California,
Los Angeles
Los Angeles, California - [redacted]

Rotating Radiology Internship,
National Naval Medical Center
Bethesda, Maryland

Residency in Diagnostic Radiology,
National Naval Medical Center
Bethesda, Maryland - 1973-1976

Certification: Diplomate, American Board of Radiology
(in Diagnostic Radiology) - June 1976

Medical Licensure: California - 1973 - #A025442

Professional Activities and Location Since Graduation:

Internship (Rotating Radiology), National Naval Medical Center, Bethesda, Maryland - 1972-1973

Diagnostic Radiology Residency, National Naval Medical Center, Bethesda, Maryland - 1973-1976

Director, Residency Training, Naval Regional Medical Center, San Diego, California - September 1976-July 1978

Chief, Division of Radiology of Emergency Services, Naval Regional Medical Center, San Diego, California - December 1976-July 1978

Chief, Division of Inpatient Radiology, Naval Regional Medical Center, San Diego, California - December 1976-July 1978

Chief, Division of Cardiovascular and Genitourinary Radiologic Pathology, Armed Forces Institute of Pathology, Washington, D.C. August 1978-

Clinical Appointments:

Clinical Assistant Professor of Radiology, University of California, San Diego, San Diego, California - July 1977-July 197

Visiting Lecturer in Radiology, Walter Reed Army Medical Center, Washington, D.C. - August 1978-

Visiting Lecturer in Radiology, National Naval Medical Center, Bethesda, Maryland - August 1978-

Assistant Professor, Department of Radiology and Nuclear Medicine Uniformed Services University of the Health Sciences - 19 March 1979-

Military Service:

1. Senior student program in medical school - August 1, 1971-June 13, 1972

2. Internship and Residency, National Naval Medical Center, Bethesda, Maryland - July 1, 1972-July 1, 1976

3. Promoted to Lieutenant Commander - July 1975

4. Staff Radiologist, Naval Regional Medical Center, San Diego, California - July 1976-July 1978

5. Staff Radiologist, Armed Forces Institute of Pathology, Washington, D.C. - July 1978-

Professional and Non-professional Organizational Affiliations:

American College of Radiology - July 1976

Radiological Society of North America - July 1973

San Diego Radiologic Society, member - September 1976-September 1978

Awards:

June 1977 Runner up Stitt Award for outstanding teacher of Naval Regional Medical Center, San Diego, nominated by internship class - 1976-1977, Naval Regional Medical Center, San Diego, California

June 1978 Recipient Stitt Award for outstanding teacher of Naval Regional Medical Center, San Diego, nominated by internship class - 1977-1978, Naval Regional Medical Center, San Diego, California

May 1978 Physicians recognition award, American Medical Association

Presentations:

Introduction to Chest Radiology, Montgomery County Lung Association, Washington, D.C. - October 1975

Introduction to Emergency Room Radiology, Staff Emergency Room Physicians, Naval Regional Medical Center - January 1977

Introduction to Congenital Heart Disease, Staff Thoracic Surgeons, Naval Regional Medical Center, San Diego, California - January 1978

Seminars in Diagnostic Radiology Course (GI, GU) - November 13-17, 1978

1. Pediatric GU masses
2. Two one-hour seminars of unknown GU cases

Genitourinary Radiology, National Naval Medical Center, Medical Officer Course, Nuclear Medicine Imaging and Radioisotope Techniques - February 1979

Seminars in Diagnostic Radiology Course - May 7-11, 1979

1. Pediatric renal mass
2. Benign renal tumors
3. Renal inflammatory disease
4. Renal cystic disease

Publications:

1. Ornitz, EM, Wechter, V, Hartman, D.: The EEG and rapid eye movements during REM sleep in babies. Electroencephalography and Clinical Neurophysiology (Amsterdam) 30:350-3, Apr. 1971.

2. Tanguay, PE, Ornitz, EM, Forsythe, AB, Lee, JM, Hartman, DS: Basic rest-activity cycle rhythms in the human auditory evoked response. Electroencephalography and Clinical Neurophysiology (Amsterdam) 34:593-603, 1973.

3. Wehunt, WD, Lesar, ML, Hartman, DS: Cystic lung disease in infants for publication in Radiolog.

4. Madewell, JE, Hartman, DS, Lichtenstein, JE: Radiologic and pathologic correlation in cystic disease of the kidney for publication in Radiologic Clinics of North America.

5. Hartman, DS, Madewell, JE, Wehunt, WD: Extracalyceal contrast media for publication in Radiolog.

CURRICULUM VITAE

11 January 1979

WILLIAM R. BEISEL, M.D., F.A.C.P.
Scientific Advisor
U.S. Army Medical Research Institute of Infectious Diseases (USAMRIID)
Fort Detrick, Frederick, Maryland 21701

Ex 6

A. EDUCATION

Muhlenberg College, Allentown, Pennsylvania	A.B.
Indiana University School of Medicine, Indiana	M.D.

Postgraduate

Internship, Fitzsimons Army Hospital, Denver, Colorado	1948-1949
Residency in Internal Medicine, Letterman Army Hospital, San Francisco, California	1949-1952
Medical Staff Course, Army Medical Field Service School, San Antonio, Texas (9 months)	1952-1953
Basic Sciences Course, Walter Reed Army Institute of Research, Washington, D.C. (9 months)	1956-1957
Fellowship in Metabolism, University of California, San Francisco, California (18 months)	1961-1962

B. MAJOR PROFESSIONAL POSITIONS

Military Service in Korea	1953-1954
Chief of Medicine, U.S. Army Hospital, Fort Leonard Wood, Missouri	1954-1956
Chief, Department of Metabolism and Chief, Medical Section No. 4, Walter Reed Army Hospital, Washington, D.C.	1957-1960
Chief, Physical Sciences Division, U.S. Army Medical Unit, Fort Detrick, Frederick, Maryland	1962-1968
Scientific Advisor, U.S. Army Medical Research Institute of Infectious Diseases, Frederick, Maryland	1969-Present

C. CERTIFICATIONS

Diplomate, American Board of Internal Medicine	1955
Fellow, American College of Physicians	1960

D. CURRENT APPOINTMENTS

Editorial Board Member, Journal of Nutrition
Consultant to the AMA Nutrition Advisory Group (NAG)
American Institute of Nutrition Representative on the FASEB Life Sciences Office Advisory Committee
(continued)

D. CURRENT APPOINTMENTS (continued)

Department of Defense Representative on the Interagency Committee on Recombinant DNA Research
Consultant to the National Science Foundation Office of Polar Programs
Consultant to the Artificial Kidney-Chronic Uremia Program, NIAMDD, NIH
Member, Advisory Committee to the World Hunger Programme, United Nations University
Member, International Union of Nutritional Sciences Committee on Nutrition and Infection
Member, Research and Education Committee, V.A. Hospital, Baltimore, Maryland
Member, Institutional Review Board for the Protection of Human Subjects, Frederick Cancer Research Center
Member, Hood Graduate School Advisory Council

E. FORMER APPOINTMENTS

Colonel, Medical Corps, U.S. Army. Retired, 1968.
Assistant Clinical Professor of Medicine, Georgetown University
Army Representative, NIH Study Section, Endocrinology
Army Representative, NIH Study Section, Pharmacology and Experimental Therapy
Member, VA Infective Agents Research Evaluation Committee
Visiting Consultant in Endocrinology, Walter Reed Army Hospital
Visiting Consultant in Endocrinology, D.C. General Hospital
Associate Professor of Medicine, University of Maryland School of Medicine
Member and Chairman, National Academy of Sciences-National Research Council Subcommittee on Nutrition and Infection
Organizing Chairman, International Workshop on Infection and Malnutrition

F. SCIENTIFIC PUBLICATIONS

Approximately 165 published papers; 8 Book Chapters

G. HONORS

AOA, Indiana University, 1947
Commendation Ribbon, Bronze Star, Korea, 1954; Legion of Merit, 1968
Hoff Medal Winner, Walter Reed Army Institute of Research, 1957
Army "A" Prefix in Specialty of Internal Medicine, 1966
$500 Award and Commendation, 1966 Army Science Conference
Stitt Award and $500 Honorarium, Association of Military Surgeons, 1967

H. PROFESSIONAL SOCIETY MEMBERSHIPS

The American College of Physicians
The Infectious Diseases Society of America
The Endocrine Society
(continued)

H. PROFESSIONAL SOCIETY MEMBERSHIPS (continued)

The American Society of Clinical Nutrition
The American Society of Microbiology
Association of Military Surgeons
American Institute of Nutrition

I. VISITING PROFESSORSHIPS

Georgetown University
Massachusetts Institute of Technology
University of Pennsylvania School of Medicine
University of Indiana School of Medicine
University of Alabama School of Medicine
Columbia University School of Medicine
Boston University School of Medicine

J. RADIOISOTOPE EXPERIENCE

a. Didactic and Laboratory Courses in Isotope Utilization
Walter Reed Army Institute of Research 1956-1957

University of California School of Medicine 1960-1961

b. Human and Animal Use of Isotopes
Walter Reed General Hospital 1957-1960

University of California School of Medicine
(San Francisco) (Chiefly ^{131}I, ^{32}P, ^{3}H, ^{14}C) 1960-1961

c. Animal and Laboratory Use of Isotopes
Principal User for USAMRIID 1961-1978

ISOTOPES	POSSESSION LIMIT
H-3	550 mCi
C-14	60 mCi
P-32	200 mCi
S-35	20 mCi
K-42	50 mCi
Ca-45	20 mCi
Ca-47	1 mCi
Cr-51	30 mCi
Mn-54	20 mCi
Fe-59	10 mCi
Zn-65	50 mCi
Ga-67	10 mCi
Sr-85	10 mCi
Rb-86	50 mCi
I-125	125 mCi
I-131	100 mCi
Yb-169	10 mCi
Au-198	35 mCi
Th-232 (Thorium Oxide)	1 lb
U-238 (Acetate and Nitrate)	1 lb
Na-22	5 mCi

d. Administration and Teaching

Radiation Protection Officer, USAMRIID
Member, WRAMC Radiation Control Committee
Member, Fort Detrick Ionizing Radiation Control Committee
Chairman, USAMRIID Ionizing Radiation Control Committee

Present number of trainee investigators under supervision 19
Present number of co-workers under supervision 29

WILLIAM R. BEISEL, M.D.

Bibliography

1. Beisel, William R. and Gillepsie, James O. Chronic segmental atelectasis. U.S. Armed Forces Med. J. 3(No. 3):407-424, March 1952.

2. Wurl, Otto A., Gillepsie, James O., and Beisel, William R. Treatment of malaria with cortisone. U.S. Armed Forces Med. J. 3(No. 9):1347-1352, September 1952.

3. Beisel, William R., Zerzan, Charles J., Jr., Rubini, Milton E., and Blythe, William B. Phosphaturesis: A direct renal effect of triiodothyronine. Am. J. Physiol. 195(No. 2):357-361, November 1958.

4. Beisel, William R., Benjamin, Naomi, and Austen, K. Frank. Absence of leukocyte alkaline phosphatase activity in hypophosphatasia. Blood 14(No. 8):975-977, August 1959.

5. Beisel, William R., Herndon, E. G., Jr., Myers, John E., and Stones, Lyle. Acute renal failure as a complication of acute pancreatitis. Arch. Intern. Med. 104: 539-543, October 1959.

6. Gangarosa, E. J., Beisel, W. R., Benyajati, Chanyo, Sprinz, H., and Piyaratn, Prapont. The nature of the gastrointestinal lesion in Asiatic cholera and its relation to pathogenesis: A biopsy study. Am. J. Trop. Med. Hyg. 9(No. 2):125-135, March 1960.

7. Joy, Robert J. T. and Beisel, William R. An exploration of the antihypertensive action of cholorothiazide. Am. J. Med. Sci. 239(No. 5):601-608, May 1960.

8. Benyajati, Chanyo, Keoplug, Muni, Beisel, William R., Gangarosa, Eugene J., Sprinz, Helmuth, and Sitprija, Visith. Acute renal failure in Asiatic cholera: Clinicopathologic correlations with acute tubular necrosis and hypokalemic nephropathy. Ann. Intern. Med. 52(No. 5):960-975, May 1960.

9. Lewis, Amos C., Rubini, Milton E., and Beisel, William R. A method for rapid dehydration of rats. J. Appl. Physiol. 15(No. 3):525-527, May 1960.

10. Beisel, William R., Austen, K. Frank, Rosen, Hyman, and Herndon, E. G., Jr. Metabolic observations in adult hypophosphatasia. Am. J. Med. 29(No. 2):369-376, August 1960.

11. Beisel, William R., Austen, K. Frank, and Rubini, Milton E. Comparison of certain metabolic effects of triiodothyronine, salicylate, and dinitrophenol. Metabolism 9(No. 10):905-915, October 1960.

12. Knochel, James P., Beisel, William R., Herndon, E. G., Jr., Gerard, Earl S., and Barry, Kevin G. The renal, cardiovascular, hematologic, and serum electrolyte abnormalities of heat stroke. Am. J. Med. 30(No. 2): 299-309, February 1961.

13. Barry, Kevin G., Cohen, Arthur, Knochel, James P., Whelan, Thomas J., Jr., Beisel, William R., Vargas, Cesar A., and LeBlanc, Preston C., Jr. Mannitol infusion. II. The prevention of acute functional renal failure during resection of an aneurysm of the abdominal aorta. N. Engl. J. Med. 264:967-971, May 1961.

14. McLaurin, Angus W., Beisel, William R., McCormick, Gerald J., Scalettar, Raymond, and Herman, Robert H. Primary hyperoxaluria. Ann. Intern. Med. 55 (No. 1):70-80, July 1961.

15. Beisel, William R., Gerard, Earl S., Barry, Kevin G., Herndon, E. G., Jr., Meroney, William H., and Kyle, Laurence H. Phosphate abnormalities in hyperparathyroidism. Metabolism 10(No. 10):771-780, October 1961.

16. Sprinz, H., Sribhidhadh, R., Benyajati, C., Gangarosa, E. J., Beisel, W. R., Kundel, D., and Halstead, S. B. An intestinal biopsy study in acute cholera and after recovery. Final Report, Thailand, SEATO Cholera Research Laboratory, Bangkok, pp. 50-64, November-December 1960, 1961.

17. Heaton, Leonard D., Beisel, William R., Sprinz, Helmuth, and Forsee, James H. Parathyroid tumors. With an analysis of 18 surgical cases and with special reference to diagnosis. Ann. Surg. 155(No. 1):90-102, January 1962.

18. Verdon, Thomas A., Jr., Bruton, Joseph, Herman, Robert H., and Beisel, William R. Clinical and chemical response of a functioning adrenal cortical carcinoma to ortho, para[1]-DDD. Metabolism 11(No. 2):226-234, February 1962.

19. Gangarosa, Eugene J. and Beisel, William R. A simple technique for obtaining a colon biopsy specimen per rectum. Gastroenterology 42(No. 2):157-159, February 1962.

20. Beisel, William R., Watten, Raymond H., Blackwell, R. Quentin, Benyajati, Chanyo, and Phillips, R. A. The role of bicarbonate pathophysiology and therapy in Asiatic cholera. NAMRU-2 Research Report MR005. 09-1040.1.11, March 1962.

21. Benyajati, Chanyo, Keoplug, Muni, Beisel, William R., Gangarosa, Eugene J., Sprinz, Helmuth, and Sitprija, Visith. Acute renal failure in Asiatic cholera: Clinicopathological correlation. SEATO Conference on Cholera, Post Publishing Co., Ltd., Bangkok, Thailand, pp. 61-64, October 1962.

22. Gangarosa, E. J., Sribhibhadh, R., Sprinz, H. Benyajati, C., Kundel, D. W., Beisel, W. R., and Halstead, S. B. Intestinal pathophysiology of Asiatic cholera. SEATO Conference on Cholera, Post Publishing Co., Ltd., Bangkok, Thailand, pp. 76-82, October 1962.

23. Beisel, William R., Scalettar, Raymond, and Barry, Kevin G. Delayed vascular complications of renal biopsy: The importance of rapid processing of biopsy material. Med. Ann. DC 31(No. 11):626-630, November 1962.

24. Smilo, Renata P., Beisel, William R., and Forsham, Peter H. Reversal of thiazide-induced transient hyperuricemia by uricosuric agents. N. Engl. J. Med. 267: 1225-1227, December 1962.

25. Beisel, W. R., Zainal, H., Hane, S., DiRaimondo, V. C., and Forsham, P. H. Low thyroidal iodine uptake with euthyroidism associated with deficient thyroid-binding globulin but normal cortisol binding. J. Clin. Endocrinol. Metab. 22(No. 12):1165-1170, December 1962.

26. Kyle, Laurence H., Beisel, William R., and Canary, John J. Evaluation of the relative value of diagnostic tests in hyperparathyroidism. Ann. Intern. Med. 57(No. 6):957-962, December 1962.

27. Beisel, William R., Watten, Raymond H., Blackwell, R. Quentin, Benyajati, Chanyo, and Phillips, R. A. The role of bicarbonate pathophysiology and therapy in Asiatic cholera. Am. J. Med. 35(No. 1):58-66, July 1963.

28. Bass, J. W. and Beisel, W. R. Coma due to acute cholorothiazide intoxication. Am. J. Dis. Child. 106:620-623, December 1963.

29. Beisel, W. R., DiRaimondo, V. C., and Forsham, P. H. Cortisol transport and disappearance. Ann. Intern. Med. 60(No. 4):641-652, April 1964.

30. Beisel, William R., DiRaimondo, Vincent C., Chao, Ping Yu, Rosner, Jorge M., and Forsham, Peter H. The influence of plasma protein binding on the extra-adrenal metabolism of cortisol in normal hyperthyroid and hypothyroid subjects. Metabolism 13(No. 10):942-951, October 1964.

31. Beisel, William R., Cos, Juan J., Horton, Richard, Chao, Ping Yu, and Forsham, Peter H. Physiology of urinary cortisol excretion. J. Clin. Endocrinol. Metab. 24(No. 9):887-893, September 1964.

32. Beisel, William R. Metabolic and endocrine effects of infection and hyperthermia. Symposium on Medical Aspects of Stress in the Military Climate. Walter Reed Army Institute of Research, U.S. Government Printing Office, Washington, D. C., pp. 523-539, April 1964, 1965.

33. Beisel, William R. and Crozier, Dan. The impact of acute infection on metabolism in human subjects. Army Sci. Conf. Proc. 1:37-48, 1966.

34. Rapoport, Morton I., Hodoval, Leland F., Grogan, Earl W., McGann, Virginia, and Beisel, William R. The influence of specific antibody on the disappearance of staphylococcal enterotoxin B from blood. J. Clin. Invest. 45(No. 9):1365-1372, September 1966.

35. Shambaugh, George E., III, and Beisel, William R. Alterations in thyroid physiology during pneumococcal septicemia in the rat. Endocrinology 79(No. 3):511-523, September 1966.

36. Rapoport, Morton I., Feigin, Ralph D., Bruton, Joseph, and Beisel, William R. Circadian rhythm for tryptophan pyrrolase activity and its circulating substrate. Science 153(No. 3744):1642-1644, September 1966.

37. Hodoval, Leland F., Rapoport, Morton I., and Beisel, William R. A radiobioassay for staphylococcal enterotoxin B antitoxin. J. Lab. Clin. Med. 68(No. 4): 678-685, October 1966.

38. Beisel, William R. Effect of infection on human protein metabolism. Fed. Proc. 25(No. 6):1682-1687, November-December 1966.

39. Beisel, William R., Bruton, Joseph, Anderson, Kelly D., and Sawyer, William D. Adrenocortical responses during tularemia in human subjects. J. Clin. Endocrinol. Metab. 27(No. 1):61-69, January 1967.

40. Beisel, William R. Neutrophile alkaline phosphatase changes in tularemia, sandfly fever, Q fever, and noninfectious fevers. Blood 29(No. 2):257-268, February 1967.

41. Lust, George and Beisel, William R. Alterations of alkaline phosphatase in mouse tissues after experimental infection. Proc. Soc. Exp. Biol. Med. 124: 812-816, March 1967.

42. Hodoval, Leland F., Morris, Earl L., Elsberry, Dennis D., and Beisel, William R. Effect of staphylococcal enterotoxin B on the electroencephalogram of monkeys. Appl. Microbiol. 15(No. 2):403-406, March 1967.

43. Shambaugh, G. E., III, MacNair, D. S., and Beisel, W. R. Small-bowell epithelial migration during a generalized nonenteric infection in the rat. Am. J. Dig. Dis. 12(No. 4):403-408, April 1967.

44. Shambaugh, George E., III, and Beisel, William R. Insulin response during tularemia in man. Diabetes 16(No. 6):369-376, June 1967.

45. Rapoport, Morton I., Hodoval, Leland F., and Beisel, William R. Influence of thorotrast blockade and acute renal artery ligation on disappearance of staphylococcal enterotoxin B from blood. J. Bacteriol. 93(No. 3):779-783, March 1967.

46. Feigin, Ralph D., Klainer, Albert S., and Beisel, William R. Circadian periodicity of blood amino-acids in adult men. Nature 215(No. 5100):512-514, July 1967.

47. Shambaugh, George E., III, Warner, David A., and Beisel, William R. Hormonal factors altering rhythmicity of tyrosine-alpha-ketoglutarate transaminase in rat liver. Endocrinology 81(No. 4):811-818, October 1967.

48. Beisel, William R., Sawyer, William D., Ryll, Erich D., and Crozier, Dan. Metabolic effects of intracellular infections in man. Ann. Intern. Med. 67(No. 4):744 779, October 1967.

49. Morris, Earl L., Hodoval, Leland F., and Beisel, William R. The unusual role of the kidney during intoxication of monkeys by intravenous staphylococcal enterotoxin B. J. Infect. Dis. 117:273-284, October 1967.

50. Shambaugh, George E., III, and Beisel, William R. Early alterations in thyroid hormone physiology during acute infection in man. J. Clin. Endocrinol. Metab. 27(No. 12):1667-1673, December 1967.

51. Beisel, William R., Goldman, Ralph F., and Joy, Robert J. T. Metabolic balance studies during induced hyperthermia in man. J. Appl. Physiol. 24(No. 1): 1-10, January 1968.

52. Rapoport, Morton I., Lust, George, and Beisel, William R. Host enzyme induction of bacterial infection. Arch. Intern. Med. 121:11-16, January 1968.

53. Feigin, Ralph D., Klainer, Albert S., Beisel, William R., and Hornick, Richard B. Whole-blood amino acids in experimentally induced typhoid fever in man. N. Engl. J. Med. 278:293-298, February 1968.

54. Hodoval, L. F., Morris, E. L., Crawley, G. J., and Beisel, W. R. Pathogenesis of lethal shock after intravenous staphylococcal enterotoxin B in monkeys. Appl. Microbiol. 16(No. 2):187-192, February 1968.

55. Beisel, William R. and Summers, Phebe W. (Compilers). Symposium on infection and metabolism. Special Report to the Commission on Epidemiological Survey of the Armed Forces Epidemiological Board. U.S. Army Medical Unit, Fort Detrick, Frederick, Maryland, February 1968.

56. Beisel, William R. Introduction to the Symposium on Infection and Metabolism. Special Report to the Commission on Epidemiological Survey of the Armed Forces Epidemiological Board, U.S. Army Medical Unit, Fort Detrick, Frederick, Maryland, pp. 1-8, February, 1968.

57. Beisel, William R. Adrenocortical response and infectious disease. Special Report to the Commission on Epidemiological Survey of the Armed Forces Epidemiological Board, U.S. Army Medical Unit, Fort Detrick, Frederick, Maryland, pp. 175-185, February 1968.

58. Rapoport, Morton I. and Beisel, William R. Circadian periodicity of tryptophan metabolism. J. Clin. Invest. 47(No. 4):934-939, April 1968.

59. Klainer, Albert S., Beisel, William R., and Atkins, William K. Determination of serum glycoproteins on cleared cellulose acetate strips. Am. J. Clin. Path. 50(No. 1):137-141, July 1968.

60. Beisel, W. R. Metabolic approach to the diagnosis of infectious disease (U). Commission on Epidemiological Survey Annual Report to the Armed Forces Epidemiological Board, U.S. Army Medical Unit, Fort Detrick, Frederick, Maryland, 68-MU-37, pp. 81-94, November 1968. SECRET

61. Beisel, William R., Woeber, Kenneth A., Bartelloni, Peter J., and Ingbar, Sidney H. Growth hormone response during sandfly fever. J. Clin. Endocrinol. Metab. 28(No. 8):1220-1223, August 1968.

62. Feigin, Ralph D., Klainer, Albert S., and Beisel, William R. Factors affecting circadian periodicity of blood amino acids in man. Metabolism 17:764-775, September 1968.

63. Klainer, Albert S., Clyde, David F., Bartelloni, Peter J., and Beisel, William R. Serum glycoproteins in experimentally-induced malaria in man. J. Lab. Clin. Med. 72(No. 5):794-802, November 1968.

64. Shambaugh, George E., III, and Beisel, William R. Endocrine influences on altered hepatic tyrosine transaminase activity during pneumococcal septicemia in the rat. Endocrinology 83(No. 5):965-974, November 1968.

65. Squibb, R. L., Lyons, M. M., and Beisel, W. R. Virus involvement in the avian heart: Effect on protein synthesis. J. Nutr. 96(No. 4):509-512, December 1968.

66. Feigin, Ralph D., Dangerfield, Harry G., and Beisel, William R. Circadian periodicity of blood amino acids in normal and adrenalectomized mice. Nature 221(No. 5175):94-95, January 1969.

67. Beisel, William R. and Rapoport, Morton I. Interrelations between adrenocortical functions and infectious illness. N. Engl. J. Med. 280:541-546, March 1969.

68. Beisel, William R. and Rapoport, Morton I. Interrelations between adrenocortical functions and infectious illness (Concluded). N. Engl. J. Med. 280: 596-604, March 1969.

69. Kehoe, J. Michael, Lust, George, and Beisel, William R. Lymphoid tissue-corticosteriod interaction: An early effect on both Mg^{2+} and Mn^{2+}-activated RNA polymerase activities. Biochim. Biophys. Acta. 174: 761-763, February 1969.

70. Staab, Edward V., Niederhuber, John, Rhoda, David A., Faulkner, Charles S., II, and Beisel, William R. Role of the kidney in staphylococcal enterotoxemia. Appl. Microbiol. 17(No. 3):394-398, March 1969.

71. Klainer, Albert S., Gilliland, Paul F., Cirksena, William J., Bartelloni, Peter J., and Beisel, William R. Serum glycoproteins in naturally-acquired malaria in man. Arch. Intern. Med. 123:620-625, June 1969.

72. Pekarek, R. S., Bostian, K. A., Bartelloni, P. J., Calia, F. M., and Beisel, W. R. The effects of Francisella tularensis infection on iron metabolism in man. Am. J. Med. Sci. 258(No. 1):14-25, July 1969.

73. Elsberry, D. D., Rhoda, D. A., and Beisel, W. R. Hemodynamics of staphylococcal B enterotoxemia and other types of shock in monkeys. J. Appl. Physiol. 27(No. 2):164-169, August 1969.

74. Pekarek, Robert S. and Beisel, William R. Effect of endotoxin upon serum zinc concentrations in the rat. Appl. Microbiol. 18(No. 3):482-484, September 1969.

75. Bartelloni, P. J., Calia, F. M., Minchew, B. H., Beisel, W. R., and Ley, H. L., Jr. Absorption and excretion of two chloramphenicol products in humans after oral administration. Am. J. Med. Sci. 258(No. 3):203-208, September 1969.

76. Beisel, William R. Mechanisms of staphylococcal enterotoxin B antibody protection. Commission on Epidemiological Survey Annual Report to the Armed Forces Epidemiological Board. U.S. Army Medical Research Institute of Infectious Diseases, Fort Detrick, Frederick, Maryland, pp. 69-90, December 1969.

77. Klainer, A. S. and Beisel, W. R. Opportunistic infection: A review. Am. J. Med. Sci. 258(No. 6):431-456, December 1969.

78. Rhoda, D. A., Elsberry, D. D., and Beisel, W. R. Fluid compartment alterations in the monkey with staphylococci B enterotoxemia. Am. J. Vet. Res. 31 (No. 3):507-514, March 1970.

79. Pekarek, Robert S., Burghen, George A., Bartelloni, Peter J., Calia, Frank M., Bostian, Karen A., and Beisel, William R. The effect of live attenuated Venezuelan equine encephalomyelitis virus on serum iron, zinc, and copper concentrations in man. J. Lab. Clin. Med. 76(No. 2):293-303, August 1970.

80. Beisel, William R. and Fiser, Robert H., Jr. Lipid metabolism during infectious illness. Am. J. Clin. Nutr. 23(No. 8):1069-1079, August 1970.

81. Rapoport, M. I., Beisel, W. R., and Hornick, R. B. Tryptophan metabolism during infectious illness in man. J. Infect. Dis. 122(No. 3):159-169, September 1970.

82. Rollins, J. Brent, Burghen, George A., and Beisel, William R. The influence of altered viral virulence on the response of host serum alpha$_2$ glycoglobulins. J. Infect. Dis. 122(No. 4):329-334, October 1970.

83. Rhoda, D. A. and Beisel, W. R. Lymph production during staphylococcic B enterotoxemia-induced shock in monkeys. Am. J. Vet. Res. 31(No. 10):1845-1851, October 1970.

84. Burghen, George A., Beisel, William R., and Bartelloni, Peter J. Influences of chloramphenicol administration on whole blood amino acids in man. Clin. Med. 77: 26-29, November 1970.

85. Beisel, William R. and Crozier, Dan. USAMRIID seeks to develop therapy for biological agents. Army Research and Development Newsmagazine 11:68-69, November-December 1970.

86. Beisel, William R. Effects of acute infectious illnesses on sustained work performance in man. Commission on Epidemiological Survey Annual Report to the Armed Forces Epidemiological Board, U.S. Army Research Institute of Infectious Diseases, Frederick, Maryland, pp. 235-244, December 1970.

87. Feigin, Ralph D., Beisel, William R., and Wannemacher, Robert W., Jr. Rhythmicity of plasma amino acids and relation to dietary intake. Am. J. Clin. Nutr. 24(No. 3):329-341, March 1971.

88. Burghen, George A., Beisel, William R., Walker, Jerry S., Nims, Robert M., Huxsoll, David L., and Hildebrandt, Paul K. Development of hypergammaglobulinemia in tropical canine pancytopenia. Am. J. Vet. Res. 32(No. 5): 749-756, May 1971.

89. Rapoport, M. I. and Beisel, W. R. Studies on tryptophan metabolism in experimental animals and man during infectious illness. Am. J. Clin. Nutr. 24(No. 7):807-814, July 1971.

90. Beisel, W. R. Discussion - "Normal" zinc levels metabolism in man. Summary of Proceedings of a Workshop, Food and Nutrition Board, National Academy of Sciences, Zinc in Human Nutrition 23-24, December 4-5, 1970.

91. Fiser, R. H., Denniston, J. C., Rindsig, R. B., and Beisel, W. R. Effects of acute infection on cholesterogenesis in the rhesus monkey. Proc. Soc. Exp. Biol. Med. 138(No. 2):605-609, November 1971.

92. Pekarek, Robert S. and Beisel, William R. Characterization of the endogenous mediator(s) of serum zinc and iron depression during infection and other stresses. Proc. Soc. Exp. Biol. Med. 138(No. 2): 728-732, November 1971.

93. Wannemacher, R. W., Jr., Powanda, M. C., Pekarek, R. S., and Beisel, W. R. Tissue amino acid flux after exposure of rats to Diplococcus pneumoniae. Infect. Immun. 4(No. 5):556-562, November 1971.

94. Squibb, R. L., Beisel, W. R., and Bostian, K. A. Effect of Newcastle disease on serum copper, zinc, cholesterol, and cartenoid values in the chick. Appl. Microbiol. 22(No. 6):1096-1099, December 1971.

95. Beisel, William R. Food Poisoning. In: Current Therapy. ed., Howard F. Conn. W. B. Saunders Co., Philadelphia, pp. 15-18, 1972.

96. Wannemacher, R. W., Jr., Pekarek, R. S., and Beisel, W. R. Mediator of hepatic amino acid flux in infected rats. Proc. Soc. Exp. Biol. Med. 139(No. 1): 128-132, January 1972.

97. Bellanti, Joseph A., Krasner, Robert I., Bartelloni, Peter J., Yang, Mei C., and Beisel, William R. Sandfly fever: Sequential changes in neutrophil biochemical and bactericidal functions. J. Immunol. 108(No. 1):142-151, January 1972.

98. Fiser, Robert H., Rollins, J. Brent, and Beisel, William R. Decreased resistance against infectious canine hepatitis in dogs fed a high-fat ration. Am. J. Vet. Res. 33(No. 4):713-719, April 1972.

99. Wannemacher, Robert W., Jr., Pekarek, Robert S., Bartelloni, Peter J., Vollmer, Robin T., and Beisel, William R. Changes in individual plasma amino acids following experimentally induced sand fly fever virus infection. Metabolism 21(No. 1):67-76, January 1972.

100. Beisel, William R. Hypercholesterolemia and altered immunity. Commission on Epidemiological Survey Annual Report to the Armed Forces Epidemiological Board. Fiscal Year 1971. pp. 91-98, December 1971.

101. Fiser, Robert H., Denniston, Joseph C., and Beisel, William R. Infection with Diplococcus pneumoniae and Salmonella typhimurium in monkeys: Changes in plasma lipids and lipoproteins. J. Infect. Dis. 125(No. 1):54-60, January 1972.

102. Pekarek, Robert S., Beisel, William R., Bartelloni, Peter J., and Bostian, Karen A. Determination of serum zinc concentrations in normal adult subjects by atomic absorption spectrophotometry. Am. J. Clin. Path. 57(No. 4):506-510, April 1972.

103. Fiser, R. H., Denniston, J. C., Kastello, M. D., Rindsig, R. B., and Beisel, W. R. Cholesterogenesis during acute infection in chronically hypercholesterolemic rhesus monkeys. Proc. Soc. Exp. Biol. Med. 140(No. 1): 314-318, May 1972.

104. Wannemacher, R. W., Jr., DuPont, H. L., Pekarek, R. S., Powanda, M. C., Schwartz, A., Hornick, R. B., and Beisel, W. R. An endogenous mediator of depression of amino acids and trace metals in serum during typhoid fever. J. Infect. Dis. 126(No. 1):77-86, July 1972.

105. Lees, Robert S., Fiser, Robert H., Jr., Beisel, William R., and Bartelloni, Peter J. Effects of an experimental viral infection on plasma lipid and lipoprotein metabolism. Metabolism 21(No. 9):825-833, September 1972.

106. Beisel, William R. Pathophysiology of staphylococcal enterotoxin, type B, (SEB) toxemia after intravenous administration to monkeys. Toxicon 10:433-440, August 1972.

107. Pekarek, Robert S., Wannemacher, Robert W., Jr., and Beisel, William R. The effect of leukocytic endogenous mediator (LEM) on the tissue distribution of zinc and iron. Proc. Soc. Exp. Biol. Med. 140(No. 2): 685-688, June 1972.

108. Beisel, William R., Herman, Yaye F., Sauberlich, Howerde E., Herman, Robert H., Bartelloni, Peter J., and Canham, John E. Experimentally induced sandfly fever and vitamin metabolism in man. Am. J. Clin. Nutr. 25(No. 11):1165-1173, November 1972.

109. Beisel, William R. Interrelated changes in host metabolism during generalized infectious illness. Am. J. Clin. Nutr. 25(No. 11):1254-1260, November 1972.

110. Pekarek, R. S., Wannemacher, R. W., Jr., Chapple, F. E., III, Powanda, M. C., and Beisel, W. R. Further characterization and species specificity of leukocytic endogenous mediator (LEM). Proc. Soc. Exp. Biol. Med. 141(No. 2):643-648, November 1972.

111. Beisel, William R. and Pekarek, Robert S. Acute stress and trace element metabolism. Int. Rev. Neurobiol., Suppl. 1:53-82, 1972.

112. Squibb, R. L., Solotorovsky, M., and Beisel, W. R. Quantitation of the bioenergetics of a tuberculosis infection in chicks. Appl. Microbiol. 24(No. 6): 924-928, December 1972.

113. Bilbrey, Gordon L. and Beisel, William R. Depression of free water clearance during pneumococcal bacteremia. Ann. Surg. 177(No. 1):112-120, January 1973.

114. Beisel, William R. Editorial - A role for glucagon during infection. N. Engl. J. Med. 288:734-735, April 1973.

115. Cockerell, G. L., and Beisel, W. R. Comparison of serum protein-bound carbohydrate and glycoprotein patterns of man, monkey and rat. Br. J. Exp. Path. 54:49-55, 1973.

116. Beisel, William R. Botulism! (Questions and Answers). Drug Ther. 3(No. 4):100-101, April 1973.

117. Fiser, R. H., Jr., Denniston, J. C., McGann, V. G., Kaplan, J., Adler, W. H., III, Kastello, M. D., and Beisel, W. R. Altered immune functions in hypercholesterolemic monkeys. Infect. Immun. 8(No. 1): 105-109, July 1973.

118. Fiser, R. H., Jr., Shultz, T. D., Rindsig, R. B., and Beisel, W. R. Alterations in plasma and brain lipid metabolism during endotoxemia in the neonatal rat. Biol. Neonate 22:155-160, July 1973.

119. Rayfield, Elliot J., Curnow, Randall T., George, David T., and Beisel, William R. Impaired carbohydrate metabolism during a mild viral illness. N. Engl. J. Med. 289:618-621, September 1973.

120. Alluisi, Earl A., Beisel, William R., Bartelloni, Peter J., and Coates, Glynn D. Behavioral effects of tularemia and sandfly fever in man. J. Infect. Dis. 128(No. 6):710-717, December 1973.

121. Beisel, William R. Recognizing and treating common food poisoning. Drug. Ther. 4(No. 2):72-75, February 1974.

122. Fiser, R. H., Denniston, J. C., and Beisel, W. R. Endotoxemia in the rhesus monkey: Alterations in host lipid and carbohydrate metabolism. Pediat. Res. 8:13-17, January 1974.

123. Fiser, Robert H., Jr., Denniston, Joseph C., Rindsig, Russel B., and Beisel, William R. Triglyceride secretion rates: Use of triton WR 1339 in the rhesus monkeys. J. Nutr. 104(No. 2): 223-226, February 1974.

124. Rosenberg, Irwin H., Beisel, William R., Gordon, John E., Katz, Michael, Keusch, Gerald T., Luckey, T. Don., and Mata, Leonardo J. Infant and child enteritis-malabsorption-malnutrition: the potential of limited studies with low-dose antibiotic feeding. Am. J. Clin. Nutr. 27(No. 3):304-309, March 1974.

125. Beisel, William R., Morgan, Jr., Ben B., Bartelloni, Peter J., Coates, Glynn D., DeRubertis, Frederick R., and Alluisi, Earl A. Symptomatic therapy in viral illness. A controlled study of effects on work performance. JAMA 228(No. 5):581-584, April 1974.

126. Rayfield, Elliot J., George, David T., and Beisel, William R. Altered growth hormone homeostasis during acute bacterial sepsis in the rhesus monkey. J. Clin. Endocrinol. Metab. 38(No. 5):746-754, May 1974.

127. Pekarek, Robert, Wannemacher, Robert, Powanda, Michael, Abeles, Fred, Mosher, Deane, Dinterman, Richard, and Beisel, William. Further evidence that leukocytic endogenous mediator (LEM) is not endotoxin. Life Sci. 14(No. 9):1765-1776, 1974.

128. Pekarek, Robert S., Hauer, Edward C., Wannemacher, Jr., Robert W., and Beisel, William R. The direct determination of serum chromium by an atomic spectrophotometer with a heated graphite atomizer. Anal. Biochem. 59:283-292, 1974

129. Beisel, William R., Pekarek, Robert S., and Wannemacher, Jr., Robert W. The impact of infectious disease on trace-element metabolism of the host. In Trace Element Metabolism in Animals - 2. Ed, W. G. Hoekstra, J. W. Suttie, H. E. Ganther, and Walter Mertz. University Park Press, Baltimore, Maryland, pp. 217-240, 1974.

130. Beisel, W. R. Nutrient wastage during infection. Proc. 9th Int. Congr. Nutrition, Mexico 1972, Vol. 2:160-167, 1975. S. Karger, Basel, Switzerland.

131. Pekarek, R. S. and Beisel, W. R. Redistribution and sequestering of essential trace elements during acute infection. Proc. 9th Int. Congr. Nutrition, Mexico 1972, Vol. 2:193-198, 1975. S. Karger, Basel, Switzerland.

132. Wannemacher, Jr., Robert W., Dinterman, Richard E., Pekarek, Robert S., Bartelloni, Peter J., and Beisel, William R. Urinary amino acid excretion during experimentally induced sandfly fever in man. Am. J. Clin. Nutr. 28(No. 2):110-118, February 1975.

133. Beisel, William R. The overall status of USAMRIID research and activities. In 1974 USAMRIID Planning Session with the Ad Hoc Study Group for Special Infectious Disease Problems, pp. 1-13, January 1975.

134. Wannemacher, Jr., R. W., Pekarek, R. S., Thompson, W. L., Curnow, R. T., Beall, F. A., Zenser, T. V., DeRubertis, F. D., and Beisel, W. R. A protein from polymorphonuclear leukocytes (LEM) which affects the rate of hepatic amino acid transport and synthesis of acute-phase globulins. Endocrinology 96:651-661, March 1975.

135. Elwell, M. R., Sammons, M. L., Liu, C. T., and Beisel, W. R. Changes in blood pH in rats after infection with Streptococcus pneumoniae. Infect. Immun. 11(No. 4): 724-726, April 1975.

136. Wannemacher, Jr., Robert W., Pekarek, Robert S., Klainer, Albert S., Bartelloni, Peter J., DuPont, Herbert L., Hornick, Richard B., and Beisel, William R. Detection of a leukocytic endogenous mediator-like mediator of serum amino acid and zinc depression during various infectious illnesses. Infect. Immun. 11(No. 4):873-875, April 1975.

137. Elwell, M. R., Liu, C. T., Spertzel, R. O., and Beisel, W. R. Mechanisms of oral staphylococcal enterotoxin B-induced emesis in the monkey. Proc. Soc. Exp. Biol. Med. 148:424-427, 1975.

138. Beisel, W. R. Metabolic response to infection. In Annual Review of Medicine: Selected Topics in the Clinical Sciences, Ed, William P. Creger, C. H. Coggins, and E. W. Hancock. Annual Reviews Inc., Palo Alto, California, Vol. 26:9-20, 1975.

139. Pekarek, Robert S., Kluge, R. M., DuPont, H. L., Wannemacher, Jr., R. W., Hornick, R. B., Bostian, K. A., and Beisel, W. R. Serum zinc, iron, and copper concentrations during typhoid fever in man: Effect of chloramphenicol therapy. Clin. Chem. 21(No. 4):528-532, 1975.

140. Beisel, William R. Synergistic effects of maternal malnutrition and infection on the infant. Recommendations for prospective studies in man. Am. J. Dis. Child. 129: 571-574, May 1975.

141. Pekarek, R. S., Hauer, E. C., Rayfield, E. J., Wannemacher, Jr., R. W., and Beisel, William R. Relationship between serum chromium concentrations and glucose utilization in normal and infected subjects. Diabetes 24(No. 4):350-353, April 1975.

142. Beisel, William R. The effects of malnutrition on immunological responses of the host: The key role of scarce amino acids. In Western Hemisphere Nutrition Congress IV, Ed, Philip L. White, and Nancy Selvey. Publishing Sciences Group, Inc., Acton, Massachusetts, pp. 313-318, 1975.

143. Beisel, William R. Enterotoxin-mediated diseases. In Trace Substances and Health. A Handbook. Part 1, Ed, P.M. Newberne. Marcel Dekker, Inc., N.Y., N.Y., pp. 1-66, February 1976.

144. Beisel, William R. Current status of USAMRIID and its research activities. In 1975 USAMRIID Planning Session with the Ad Hoc Study Group for Special Infectious Disease Problems. pp. 9-19, January 1976.

145. Beisel, William R. The influence of infection or injury on nutritional requirements during adolescence. In Nutrient Requirements in Adolescence. Ed, John I. McKigney, and Hamish N. Munro. The MIT Press, Cambridge, Massachusetts, pp. 257-278, 1976.

146. Kaufmann, Robert L., Matson, Charles F., and Beisel, William R. Hypertriglyceridemia produced by endotoxin: Role of impaired triglyceride disposal mechanisms. J. Infect. Dis. 133(No. 5):548-555, May 1976.

147. Bostian, Karen A., Blackburn, Billy S., Wannemacher, Jr., Robert W., McGann, Virginia G., Beisel, William R., and DuPont, Herbert L. Sequential changes in the concentration of specific serum proteins during typhoid fever in infection in man. J. Lab. Clin. Med. 87(No. 4):577-585, April 1976.

148. Kaufmann, Robert L., Matson, Charles F., Rowberg, Alan H. and Beisel, William R. Defective lipid disposal mechanisms during bacterial infection in rhesus monkeys. Metabolism 25(No. 6):615-624, June 1976.

149. Beisel, William R. Trace elements in infectious processes. Med. Clin. North Am. 60(No. 4):831-849, July 1976.

150. Powanda, M. C., Dinterman, R. E., Wannemacher, Jr., R. W., and Beisel, W. R. Tryptophan metabolism in relation to amino acid alterations during typhoid fever. Acta Vitaminol. Enzymol. (Milano) 29:164-168, December 1975.

151. Katz, Michael, Beisel, William R., Keusch, Gerald T., Mata, Leonardo J., Suskind, Robert, and Stiehm, E., Richard. Immune response of the malnourished child. A position paper of the Food and Nutrition Board of the National Research Council. National Academy of Sciences, Washington, D.C., pp. 1-22, May 1976.

152. Beisel, William R., Pekarek, Robert S., and Wannemacher, Jr., Robert W. Homeostatic mechanisms affecting plasma zinc levels in acute stress. In Trace Elements in Human Health. Vol. 1. Zinc and Copper. Chapter 6. Ed. A. S. Prasad. Academic Press, Inc., New York, pp. 87-106, 1976.

153. Patrick, III, William C. and Beisel, William R. In-house peer review: An effective mechanism for research management. Army Research and Development News Magazine, Vol. 17:19-20, July-August 1976.

154. Woodward, Theodore E., Beisel, William R., and Faulkner, Roy D. Marylanders defeat Philadelphia: Yellow fever updated. Transactions of the American Clinical and Climatological Association, Vol. 87:69-101, 1976.

155. Wannemacher, Jr., Robert W., Klainer, Albert S., Higbee, Glen A., and Beisel, William R. Trace element changes during infections at various ages. In The Biomedical Role of Trace Elements in Aging. Ed. J. M. Hsu, R. L. Davis, and R. W. Neithamer. Eckerd College Gerontology Center, St. Petersburg, Florida, pp. 175-187, 1976.

156. Wannemacher, Jr., R. W., Klainer, A. S., Dinterman, R. E., and Beisel, W. R. The significance and mechanism of an increased serum phenylalanine-tyrosine ratio during infection. Am. J. Clin. Nutr. 29:997-1006, September 1976.

157. Beisel, William R. Malnutrition as a consequence of stress. In Malnutrition and the Immune Response. Ed. R. M. Suskind. Raven Press, New York, pp. 21-26, 1977.

158. Beisel, William R. Nonspecific host factors--A review. In Malnutrition and the Immune Response. Ed. R. M. Suskind. Raven Press, New York, pp. 341-354, 1977.

159. Beisel, William R., Cockerell, Gary L., and Janssen, Werner A. Nutritional effects on the responsiveness of plasma acute-phase reactant glycoproteins. In Malnutrition and the Immune Response. Ed. R. M. Suskind. Raven Press, New York, pp. 395-402, 1977.

160. Liu, C. T., Helm, III, J. D., and Beisel, W. R. Cardiovascular and vomiting responses to a lethal intravenous dose of staphyloenterotoxin A in rhesus monkeys. J. Med. Primatol. 5:353-359, 1976.

161. Wannemacher, Jr., Robert W., Dinterman, Richard E., Rayfield, Elliot J., and Beisel, William R. Effect of glucose infusion on the concentration of individual serum free amino acids during sandfly fever in man. Am. J. Clin. Nutr. 30:573-578, April 1977.

162. Beisel, William R. Zinc metabolism in infection. In Zinc Metabolism: Current Aspects in Health and Disease. Eds. G. J. Brewer and A. S. Prasad. Alan R. Liss, Inc., New York, New York, pp. 155-176, 1977.

163. Beisel, William R. Infectious diseases. In Nutritional Support of Medical Practice. Eds. H. A. Schneider, C. E. Anderson, and D. B. Coursin. Harper and Row, Publishers, Inc., Hagerstown, Maryland, pp. 350-366, 1977.

164. Sammons, Lenora S., Kenyon, Richard H., Burger, Gary T., Beisel, William R., and Pedersen, Carl E., Jr. Studies on Macaca mulatta infected with Rocky Mountain spotted fever. Am. J. Vet. Res. 38:907-910, June 1977.

165. Sammons, Lenora S., Kenyon, Richard H., Burger, Gary T., Beisel, William R., and Pedersen, Jr., Carl E. Studies on Macaca mulatta infected with Rocky Mountain spotted fever. Am. J. Vet. Res. 38:907-910, June 1977.

166. Beisel, William R., Blackburn, George L., Feigin, Ralph D., Keusch, Gerald T., Long, Calvin L., and Nichols, Buford L. Proceedings of a Workshop: Impact of infection on nutritional status of the host. Am. J. Clin. Nutr. 30: 1203, August 1977.

167. Beisel, William R. Impact of infection on nutritional status: Definition of the problem and objectives of the Workshop. Am. J. Clin. Nutr. 30:1206-1210, August 1977.

168. Beisel, William R. Magnitude of the host nutritional responses to infection. Am. J. Clin. Nutr. 30:1236-1247, August 1977.

169. Beisel, William R. Resume of the discussion concerning the nutritional consequences of infection. Am. J. Clin. Nutr. 30:1294-1300, August 1977.

170. Nichols, B. L., Bilbrey, G. L., Hazelwood, C. F., Kimzey, S. L., Liu, C. T., Viteri, F., Alvarade, J., and Beisel, W. R. Sequential changes in body composition during infection: Electron probe study IV. Am. J. Clin. Nutr. 30:1439-1446, September 1977.

171. Beisel, William R. Impact of infection on nutritional status. Concluding comments and summary. Am. J. Clin. Nutr. 30:1564-1566, September 1977.

172. Wannemacher, Jr., Robert W. and Beisel, William R. Metabolic response of the host to infectious disease. In Nutritional Aspects of Care in the Critically Ill. Eds. J. R. Richards and J. M. Kinney. Churchhill Livingstone, Edinburgh, pp. 153-159, 1977.

173. Beisel, William R. Metabolic and nutritional consequences of infection. In Advances in Nutritional Research. Ed. Harold H. Draper. Plenum Publishing Corp., New York, pp. 125-144, 1977.

ITEM 8

TRAINING AND EXPERIENCE

MM/2/d

HEALTH PHYSICS
WALTER REED ARMY MEDICAL CENTER
Washington, D.C. 20012

HSWP-QHP
MEMO #9*

16 July 1979

PROCEDURE FOR OBTAINING AUTHORIZATION TO USE RADIOACTIVE MATERIAL

1. GENERAL. This memorandum outlines the procedures for individuals to obtain authorization to use radioactive materials under the Walter Reed Army Medical Center Nuclear Regulatory Commission Licenses and Department of the Army Authorization. It also specifies the categories of radioisotope users (i.e. Principal User, Co-Worker, Trainee and Technician) and the responsibilities of these users.

2. PROCEDURE

a. To obtain authorization to use radioactive materials or to renew an existing authorization, individuals will submit "Application for Authorization To Use Radioactive Materials", on WRAMC Form 1661R (Human Use) or on WRAMC Form 1662R (Non-Human Use). These forms will be reviewed in accordance with Health Physics Memo No. 4, "Organization and Function of the Radiation Control Committee Subcommittees", 30 April 1979. Definitions of the terms Principal User, Co-Worker, Trainee and Technician are printed on these forms.

b. In addition to the above forms each Principal User and Co-Worker is required to submit a completed WRAMC Form 1643, "Training and Experience of Authorized Radioisotope Users". Physicians requesting a Human Use Authorization are also required to submit a completed Form NRC 313-M Supplement B.

c. If animals are to be used by a Principal User, the application should state the animals to be used and their location.

3. EVALUATION

a. "Application for Authorization To Use Radioactive Materials" will be individually reviewed. The applicant is expected to demonstrate in the application that based upon his/her training and experience and the equipment and facilities available that the radioactive materials requested will be used in a safe manner and in accordance with existing directives.

b. The applicant can be required to obtain additional training, experience, equipment or facilities if it is deemed necessary.

*This MEMO supersedes HP MEMO No. 9, Laboratory Facilities, 19 Sept 1977

4. TERMINATION OF AN AUTHORIZATION

a. An authorization may be terminated by the Principal User at any time. When such termination occurs, it is the responsibility of the Principal User to notify the Health Physics Officer in a timely manner so that a close-out survey of the area involved may be conducted.

b. An authorization may be terminated by the Radiation Control Committee if it is determined that the Principal User has not complied with his/her Authorization provisions. The Health Physics Officer has the authority to suspend the use of radioactive materials by a Principal User if in his/her opinion a condition exists necessitating such action. If such conditions are not corrected, the Radiation Control Committee may after review of the situation terminate the authorization, continue the suspension pending correction of the condition or rescind the suspension.

ROBERT M. QUILLIN
LTC, MSC
Health Physics Officer

APPLICATION FOR AUTHORIZATION TO USE RADIOACTIVE MATERIAL - HUMAN USE

1. APPLICATION FOR: (Check and/or complete as appropriate)	NEW AUTHORIZATION:	RENEWAL OF AUTHORIZATION NUMBER	AMENDMENT TO AUTHORIZATION NUMBER

2. APPLICANT'S NAME (Prinicipal User):	3. APPLICANT'S MAILING ADDRESS (Include Organization):
TELEPHONE NUMBER	

(IF MORE SPACE IS NEEDED FOR ANY ITEM, USE ADDITIONAL PROPERLY KEYED PAGES.)

4. List all CO-WORKERS w/grade & org. Attach comp WRAMC Form 1643 if not on file with WRAMC HPO.	5. List all TRAINEES w/grade & org.	6. List all TECHNICIANS who will work with RAD MAT under this Authorization.

7. LOCATION WHERE MATERIAL WILL BE USED:

8. LOCATIONS WHERE MATERIAL WILL BE STORED:

9. RADIOACTIVE WASTE SINK AUTHORIZED IN ROOM:

10. Radioisotope	11. Chemical and/or Physical Form	12. Possession Limit	13. Use	14. Sealed or Unsealed Source

15. CERTIFICATE
(This item must be completed by applicant)

I certify compliance with the provisions of AR 40-7 (Clinical Use of Investigational Drugs), AR 70-25 (Use of Volunteers as Subjects of Research), AR 40-37 (Radioisotope License Program-Human Use), All applicable WRAMC Regulations, and that all information contained herein, including any supplements attached hereto, is true and correct to the best of my knowledge and belief.

I acknowledge my responsibilities as PRINCIPAL USER as defined in WRAMC Regulations.	ADMINISTRATIVE APPROVAL:
(Signature of Principal User & Date)	(Signature of Chief of Svc, Dept, or Div. & Date)

16. WRAMC RADIATION CONTROL COMMITTEE APPROVAL		
APPROVED:	APPROVED:	AUTHORIZATION NO:
HEALTH PHYSICS OFFICER, WRAMC	CHAIRPERSON SUBCOMMITTEE FOR HUMAN USE RADIATION CONTROL COMMITTEE, WRAMC	REVIEW DATE:

WRAMC FORM 1661-R (PREVIOUS EDITIONS ARE OBSOLETE) 1 MAR 79

(Over)

b. For those items that do not require amendment indicate as N/C (no change).
c. For those items that require amendment indicate the proposed changes to the current authorization.

3. Explanation of WRAMC Form 1661-R Items:

1. Self explanatory

2. The "Principal User" is the individual who bears ultimate responsibility for possession, inventory and implementation of the safety procedures necessary to assure the safe use of the materials specified in the application. He is directly responsible to WRAMC Radiation Control Committee. Attach a completed WRAMC Form 1643 if a current copy is not on file with the Health Physics Office.

3. The applicant's address should include organization, activity, building, room number, and reference or office symbol.

4. A "Co-Worker" is an individual who posesses adequate training and experience with radioactive material to qualify him as a "Principal User". He works under the direction of and is responsible to the "Principal User" for the safe and proper use of the materials specified in the application. List all Co-Workers alphabetically by last name. Each Co-Worker should be identified as follows: Last name, first name, middle initial and grade. Attach a completed WRAMC Form 1643 for each Co-Worker if a current copy is not on file with the Health Physics Office.

5. A "Trainee" is an individual who works under the direct supervision of a Principal User or Co-Worker for the purpose of obtaining the necessary training and experience to qualify for either status. List all trainees alphabetically by last name. Each Trainee should be identified as follows: Last name, first name, middle initial and grade.

6. A "Technician" is an individual who works under the direct supervision of a Principal User or Co-Worker for the purpose of performing certain routine duties associated with use of materials specified in the application. He does not possess suitable training and experience to be classfied as a Principal User or Co-Worker, and is not undergoing training that would qualify him to attain either status. List all Technicians alphabetically by last name. Each Technician should be identified as follows: Last name. first name. middle initial and grade.

7-9. Self explanatory

10a. List radioisotpes by ascending mass number, i.e. The isotope with the smallest mass number is placed at the top of the column and the isotope with the greatest mass number is placed at the bottom of the column.

10b. In addition to the chemical form of the radioisotope indicate whether it is in solid or liquid or gaseous form and whether it is a sealed or unsealed source. In order for radioactive material to qualify as a "sealed source" the radioactive source must be sealed in an impervious container which has sufficient mechanical strength to prevent contact with and dispersion of the radioactive material under the conditions of use and wear for which it was designed.

10c. State the maximum millicurie amount of each chemical form of the radioisotope that must be kept in the inventory in order to satisfy mission requirements.

10d. State the intended use of each chemical form of the radioisotopes listed in Column 10a.

11-12. Self explanato

APPLICATION FOR AUTHORIZATION TO USE RADIOACTIVE MATERIAL -- NON-HUMAN USE

1. APPLICATION FOR:	☐ NEW AUTHORIZATION	☐ RENEWAL OF AUTHORIZATION NUMBER	☐ AMENDMENT TO AUTHORIZATION NUMBER

2. APPLICANT'S NAME *(Last, First, MI) (Principal User)*	3. APPLICANT'S MAILING ADDRESS *(Include Organization)*
TELEPHONE NUMBER	

(IF MORE SPACE IS NEEDED FOR ANY ITEM, USE ADDITIONAL PROPERLY KEYED PAGES.)

4. *List all* CO-WORKERS	5. *List all* TRAINEES	6. *List all* TECHNICIANS

7. LOCATIONS WHERE MATERIAL WILL BE USED: *(Building and Associated Rooms)*

8. LOCATIONS WHERE MATERIAL WILL BE STORED: *(Building and Associated Rooms)*

9. RADIOACTIVE WASTE DISPOSAL SINK IN ROOM:

10. RADIOACTIVE MATERIAL DATA

A. RADIOSOTOPE	B. CHEMICAL AND/OR PHYSICAL FORM *(Sealed or Unsealed)*	C. POSSESSION LIMIT	D. USE

INSTRUCTIONS FOR PREPARATION OF APPLICATION FOR AUTHORIZATION TO USE RADIOACTIVE MATERIAL (NON-HUMAN USE)

WRAMC FORM 1662R (FEBRUARY 1979)

GENERAL INFORMATION

1. An applicant for an "Authorization to Use Radioactive Material (Non-Human Use)" should complete WRAMC Form 1662R in detail and submit in duplicate to the WRAMC Health Physics Office.

2. Application for gamma irradiators should include a copy of the proposed Standard Operating Procedures that will be implemented to assure personnel safety during routine operation and emergency situations.

3. All proposed locations where the applicant desires to use, store, or dispose of radioactive material should be coordinated with the Health Physics Office Reactor and Survey Branch *prior* to submission of the application in order to assure expeditious processing of the application. Submission of an incomplete application will often result in a delay in issuance of an authorization because of the correspondence necessary to obtain information requested on the application.

EXPLANATION OF WRAMC FORM 1662R (FEBRUARY 1979)

1. WRAMC Form 1662R is designed for use in supplying information on radioactive materials use programs of varying complexity. The applicant should provide complete information on his proposed program for the possession and use of radioactive material for those items that do not apply, indicate as N/A (not applicable).

2. Application for new authorizations and renewal of existing authorizations should be completed in their entirety. However, applications for amendment of existing authorizations may be completed as follows:

a. Complete Items 1, 2, 3, 11, and 12.
b. For those items that do not required amendment indicate as N/C (no change).
c. For those items that require amendment indicate the proposed changes to the current authorization.

3. Explanation of WRAMC Form 1662R Items:

1. Self explanatory.

2. The "Principal User" is the individual who bears ultimate responsibility for possession, inventory and implementation of the safety procedures necessary to assure the safe use of the materials specified in the application. He is directly responsible to the WRAMC Radiation Control Committee. Attach a completed WRAMC Form 1643 if a

HEALTH PHYSICS OFFICER, WRAMC	CHAIRPERSON SUBCOMMITTEE FOR NON-HUMAN USE: RADIATION CONTROL COMMITTEE, WRAMC	REVIEW DATE:
APPROVED	APPROVED	AUTHORIZATION NO.:

WRAMC RADIATION CONTROL COMMITTEE APPROVAL

11. I ACKNOWLEDGE MY RESPONSIBILITIES AS *PRINCIPAL USER* AS DEFINED IN WRAMC REGULATIONS.	12. ADMINISTRATIVE APPROVAL:
DATE *(Signature of Principal User)*	DATE *(Signature of Chief of Svc, Dept, or Div.)*

I certify that this application is prepared in conformity with WRAMC Regulations and that all information contained herein, including any supplements attached hereto, is true and correct to the best of my knowledge and belief.

CERTIFICATE
(This item must be completed by applicant)

TRAINING AND EXPERIENCE OF AUTHORIZED RADIOISOTOPE USERS

1. NAME OF AUTHORIZED USER *(Last, First, MI)*	2. STATE OR TERRITORY IN WHICH LICENSED: *(MD, DDS, DVM, etc.)*

RANK/GRADE	ORGANIZATION	ORGANIZATIONAL DIVISION	BLDG./ROOM NO.	WRAMC AUTHORIZATION NO.

3. CERTIFICATION

SPECIALTY BOARD A	CATEGORY B	MONTH AND YEAR CERTIFIED C

4. FORMAL EDUCATION

HIGHEST ACADEMIC DEGREE ATTAINED

	Higher Educational Institutions Attended	Type of Program Pursued and Dates of Attendance	Degree, Diploma or Certificate Received and Date
a.			
b.			
c.			
d.			

5. TRAINING RECEIVED IN BASIS RADIOISOTOPE HANDLING TECHNIQUES

FIELD OF TRAINING A	LOCATION AND DATE(S) OF TRAINING *(Include course title if known)* B	TYPE AND LENGTH OF TRAINING	
		LECTURE/ LABORATORY COURSES *(Hours)* C	SUPERVISED LABORATORY EXPERIENCE *(Hours)* D
a. RADIATION PHYSICS AND INSTRUMENTATION			
b. RADIATION PROTECTION			
c. MATHEMATICS PERTAINING TO THE USE AND MEASUREMENT OF RADIOACTIVITY			
d. RADIATION BIOLOGY			
e. RADIOPHARMACEUTICAL CHEMISTRY			

TRAINING AND EXPERIENCE OF AUTHORIZED RADIOISOTOPE USERS

1. NAME OF AUTHORIZED USER *(Last, First, MI)*	2. STATE OR TERRITORY IN WHICH LICENSED: *(MD, DDS, DVM, etc.)*

RANK/GRADE	ORGANIZATION	ORGANIZATIONAL DIVISION	BLDG./ROOM NO.	WRAMC AUTHORIZATION NO.

3. CERTIFICATION

SPECIALTY BOARD A	CATEGORY B	MONTH AND YEAR CERTIFIED C

4. FORMAL EDUCATION — HIGHEST ACADEMIC DEGREE ATTAINED

	Higher Educational Institutions Attended	Type of Program Pursued and Dates of Attendance	Degree, Diploma or Certificate Received and Date
a.			
b.			
c.			
d.			

5. TRAINING RECEIVED IN BASIS RADIOISOTOPE HANDLING TECHNIQUES

FIELD OF TRAINING A	LOCATION AND DATE(S) OF TRAINING *(Include course title if known)* B	TYPE AND LENGTH OF TRAINING	
		LECTURE/ LABORATORY COURSES *(Hours)* C	SUPERVISED LABORATORY EXPERIENCE *(Hours)* D
a. RADIATION PHYSICS AND INSTRUMENTATION			
b. RADIATION PROTECTION			
c. MATHEMATICS PERTAINING TO THE USE AND MEASUREMENT OF RADIOACTIVITY			
d. RADIATION BIOLOGY			
e. RADIOPHARMACEUTICAL CHEMISTRY			

ITEM 9

INSTRUMENTATION

nn/12/e

ITEM 9 - INSTRUMENTATION

SURVEY INSTRUMENTS

Manufacturer	Model	Number Available	Range
Military Specifications	ANPDR 27	7	0-500 mR/hr
" " "	IM 174	3	0-500 R/hr
Eberline Instrument Corp.	6112	7	0-1000 R/hr
" " "	E 120	25	0-50 mR/hr
" " "	E 400	5	0-200 mR/hr
" " "	E 500	2	0-500 mR/hr
" " "	PAC-IS	1	0-2000 KCPM
" " "	PAC-ISA	1	0-2000 KCPM
" " "	PAC-ISAGA	2	0-2000 KCPM
" " "	PRM 5	2	0-500 KCPM
" " "	PRM 5 - 3	1	0-500 KCPM
Ludlum Instrument Corp.	2	29	0-50 mR/hr
" " "	3	8	0-500 mR/hr
" " "	12S	1	0-300 micro R/hr
" " "	16	1	0-50 KCPM
" " "	28	28	0-500 KCPM

ITEM 9 - INSTRUMENTATION (Cont'd)

Manufacturer	Model	Number Available	Range
Victoreen	440	7	0-300 mR/hr
"	440 RF	2	0-300 mR/hr
"	740 F	7	0-25 KmR/hr
"	808 B	4	0-100 mR/hr
Nuclear Associates	800	8	0-30 K cpm

DOSE CALIBRATORS

Manufacturer	Model	Number Available
Searle	Mediac	2
Capintec	CRC-30E	1

DIAGNOSTIC INSTRUMENTS

Type	Manufacturer	Model	Number Available
Thyroid Fluorescense System	Ortec	4820	1
Gamma Scintillation Camera	Picker	4/15	2
Rectilinear Photoscanner	Ohio Nuclear	84FDL	1
Thrombus Detector	Technical associates	ccc-4TP	1
Well Detector	Picker	6-28000	1
Rectilinear Scanner	Cleon	760	1

ITEM 9 - INSTRUMENTATION (Cont'd)

Type	Manufacturer	Model	Number Available
Thyroid Uptake System	Picker	2801-D	1
Well Counter	Searle	1285	1
Well Counter	Packard	5230	1
Well Counter	Micro Medic	Concept 4	1
Pho Gamma Camera	Searle	Phogamma HP	1
Gamma Camera	Searle	Phogamma 3	1
Gamma Camera	Searle	Micro Dot Phogamma IV	1
Well Counter	Logis	211	2
Thyroid System	Searle	4405	1
Well Counter	Nuclear Chicago	3037 B	2
Well Counter	Nuclear Chicago	SCA	1
Well Counter	Abbot Labs	III	1

OTHER INSTRUMENTS

Liquid Scintillation Counter	Packard	3380	5
Liquid Scintillation Counter	Beckman	LS 9000	1
Alpha-Gamma Proportional Counter	Beckman	Widebeta II	1
Multi Channel Gamma Analyzer	Nuclear Data	ND 660	1
Alpha-Beta Proportional System	Canberra	2201	1
Auto Gamma Counter	Nuclear Chicago	1085	1
Single Channel Gamma Analyzer	Ludlum	16	1

ITEM 9 - INSTRUMENTATION (Cont'd)

Type	Manufacturer	Model	Number Available
Single Channel Gamma Analyzer	Ludlum	2200	1
Liquid Scintillation Counter	Searle	6844	1
Liquid Scintillation Counter	Searle	6880 BP	1
Liquid Scintillation Counter	Beckman	Biogamma	1
Gamma Counter, Automatic	Nuclear Chicago	1185	4
Counter, Gamma, Manual	Beckman	8000	1
Liquid Scintillation Counter	Searle	Mark II	3
Liquid Scintillation Counter	Searle	Mark III	4
Liquid Scintillation Counter	Nuclear Chicago	6848	1
Auto Gamma	Nuclear Chicago	4227	1
Liquid Scintillation Counter	Beckman	LS 8000	1
TLD Reader	Victoreen	2800-1	1
Detector, Radioactivity	Johnston	Bactec-R301	1
Detector, Radioactivity	Johnston	Bactec 225	1
Gamma Spectrometer	Micromedic	M 5588	1
Auto Gamma	Nuclear Chicago	4219	1
Counter, Proportional	Nuclear Measure-ments	D5-2	1
Spectrometer, Liquid Scintillation	Searle	BP 6868	1
Auto Gamma	Searle	1285	2
Electrometer System, Gamma	Keithly	602	2
Electrometer System, Gamma	Keithly	35050	1
R-meter	Victoreen	570	4
Scaler	Eberline	MS-3	4

ITEM 9 - INSTRUMENTATION (Cont'd)

Type	Manufacturer	Model	Number Available
Auto Gamma	Packard Instrument Co	5986	1
Liquid Scintillation Spectrometer	Packard Instrument Co	2425	1
Liquid Scintillation Spectrometer	Beckman	LS 255	1
Liquid Scintillation Spectrometer	Beckman	LS 233	1
Auto Gamma Counter	Packard Instrument Co	5260	1
Auto Gamma Counter	Packard Instrument Co	3002	1
Liquid Scintillation Spectrometer	Packard Instrument Co	3375	4
Liquid Scintillation Spectrometer	Searle Analytic	Delta 300	1
Liquid Scintillation Spectrometer	Packard Instrument Co	PRIAS PL	1
Auto Gamma	Packard Instrument Co	9012	2
Liquid Scintillation Spectrometer	Packard Instrument Co	2450	1
Liquid Scintillation Spectrometer	Beckman	LS 345	1
R-meter	Victoreen	575	3
R-meter	Victoreen	100	6
Liquid Scintillation Spectrometer	Packard Instrument Co	3330	1
Gamma Counter	Packard Instrument Co	PRIAS PGO	1

ITEM 9 - INSTRUMENTATION (Cont'd)

Type	Manufacturer	Model	Number Available
Gamma Counter	Beckman	Biogamma	1
Liquid Scintillation Spectrometer	Packard Instrument Co	3003	2
Liquid Scintillation Spectrometer	Tracor Analytic	Mark III	1
Auto Gamma	Packard Instrument Co	5230	1
Auto Gamma	Nuclear Chicago	1185K	1
Liquid Scintillation Spectrometer	Packard Instrument Co	245	1
Liquid Scintillation Spectrometer	Packard Instrument Co	3320	1
Liquid Scintillation Spectrometer	Nuclear Chicago	Mark II	1
Liquid Scintillation Spectrometer	Beckman	LS 355	1

ITEM 10

CALIBRATION OF INSTRUMENTS

ITEM 10

CALIBRATION OF SURVEY INSTRUMENTS

1. Survey instruments will be calibrated at least annually and following repair.

2. Calibration will be performed at two points on each scale. The two points will be approximately 1/3 and 2/3 of full scale. A survey instrument may be considered properly calibrated when the instrument readings are within ± 10% of the calculated or known values for each point checked. Readings within ± 20 are considered acceptable if a calibration chart or graph is prepared and attached to the instrument.

3. Survey instruments will be calibrated by:

   Radiation Management Corporation
   Science Center Building #2
   ATTN: Mr. Stephen M. Kim
   3508 Market Street
   Philadelphia, PA 19104

4. Procedures and sources have been approved by NRC and are on file in License No. 37-13129-01.

DOSE CALIBRATOR QUALITY CONTROL

Daily Checks:

Place the calibration stick source (Amersham/Searle serial #1121 with 15.5 microcuries of ^{226}Ra as of 4/1/74) and take readings at the following settings: ^{226}Ra, ^{131}I, ^{99m}Tc, ^{75}Se, and ^{133}Xe. Remove the stick source and take background readings at the same settings. NOTE: Take extra care in placing all unshielded sources of radioactivity behind lead before taking the above readings. A small source of unshielded activity will give elevated readings.

Record all readings in the Mediac Dose Calibration log book under the proper section. Subtract all background readings from the source readings to determine net activity. If the net readings fall outside of the values listed below, re-check the following areas:

1. The serial number of the calibration source.
2. The dial setting on the dose calibrator.
3. Look for unshielded sources of radioactivity.

If the net readings still fall outside of the $\pm$ 2 SD, notify the laboratory supervisor or chief technologist and do not use the dose calibrator to determine activity on any patient dose.

Dose Calibrator #1: #028555 FSN 6720 G030005 (Comp. part)

^{226}Ra	15.01 to 16.27	($\pm$ 2 SD)	$\bar{x}$ = 15.64
^{131}I	62.06 to 65.86	($\pm$ 2 SD)	$\bar{x}$ = 63.96
^{99m}Tc	13.51 to 14.29	($\pm$ 2 SD)	$\bar{x}$ = 13.90
^{75}Se	48.23 to 53.13	($\pm$ 2 SD)	$\bar{x}$ = 50.68
^{133}Xe	0.5711 to 0.5879	($\pm$ 2 SD)	$\bar{x}$ = 0.5795

Dose Calibrator #2:

^{226}Ra	15.48 to 16.08	($\pm$ 2 SD)	$\bar{x}$ = 15.78
^{131}I	62.04 to 63.40	($\pm$ 2 SD)	$\bar{x}$ = 62.72
^{99m}Tc	13.68 to 14.44	($\pm$ 2 SD)	$\bar{x}$ = 14.06
^{75}Se	48.94 to 50.42	($\pm$ 2 SD)	$\bar{x}$ = 49.68
^{133}Xe	0.550 to 0.597	($\pm$ 2 SD)	$\bar{x}$ = 0.570

LINEARITY CHECK FOR DOSE CALIBRATORS

PRINCIPLE:

An important aspect of "Quality Control" in the radiopharmacy or Nuclear Medicine installation is the preparation and dispensing of accurately measured doses to the patients. One important aspect for proper calibration of all dose calibrators is to determine the need to apply corrections for saturation losses to measurements of high activity sources.

To determine these correction factors, a linearity should be performed on all dose calibrators at installation and at a regular interval thereafter.

PROCEDURE:

1. Linearity checks for all dose calibrators will be checked at installation and semi-annually by tracking the decay of TcO4 99m of substantial activity.

2. Milk the "oncall" generator on Wednesday. Note the exact time of the elution and the net mean TcO4 99m activity ($\bar{X}$ of three (3) separate readings).

3. At intervals of 3, 6, 24, 27, 30 and 48 hrs. after elution, reassay the TcO4 99m vial and record the actual net mean activity.

4. Using the 24 hr. reading as a reference point, calculate the expected net activity for the readings taken at 0, 3, 6, 27, 30 and 48 hrs.

ASSAY TIME (Hours $\bar{p}$ elution)	CORRECTION FACTOR
0	16.0
3	11.363
6	8.000
24	1.000
27	0.707
30	0.500
48	0.062

5. Plot the net expected activity vs the net actual activity on Log-Log graph paper.

6. Record and save all data.

7. If the net actual activity curve exceeds ± 5% of the net expected activity, the Laboratory Supervisor or the Chief Technologist should be notified immediately. The dose calibrator is not to be used until proper maintenance has been obtained.

8. Repeat linearity check after repairs have been completed.

DOSE CALIBRATOR CALIBRATION FOR GEOMETRY VARIATION

PRINCIPLE:

Large variances in activity can occur when the volume of the sample, container shape and volume or gamma energy level changes for different radionuclides used in diagnostic evaluations. To minimize this effect, correction factors should be established to determine the true activity administered to patients.

To ascertain these correction factors, a check for geometry variation should be performed at the time of installation even though manufacturer guidelines may have been already established.

PROCEDURE:

1. Prepare two (2) stock solutions as follows:

   a. I-131 stock solution - Prepare a solution of I-131 with a final concentration of approximately 1.0 millicurie per ml and with a final volume of <u>at least</u> 5.0 ml (use tap water as a dilutent).

   b. TcO_4 99m stock solution - Prepare a solution of TcO_4 99m with a final concentration of approximately 10.0 millicuries per ml and with a final volume of at least 5.0 ml (use tap water as a diluent).

2. Weigh a 1.0, 3.0, 5.0 and 10.0 ml syringe with a 25 gauge (5/8") needle in place on the Mettler.

3. Withdraw, as accurately as possible, 1.0 ml into each of the four syringes from the I-131 stock solution vial.

4. Weigh each syringe on the Mettler after adding the 1.0 ml.

5. Obtain activity reading from each syringe by taking the mean of three (3) separate readings.

6. By using the 3.0 ml syringe as a standard reference point, correct the volume that was added to the 1.0, 5.0 and 10.0 ml syringes to equal that of the 3.0 syringe.

Example:

Syringe Volume	Tare Weight	Weight after Addition of 1.0 ml
1.0	13.0	14.27
3.0	15.0	16.18
5.0	20.0	21.35
10.0	30.0	31.87

Net Weight Added	$\bar{X}$ Activity from Dose Calibrator (Three Separate Readings)
1.07	1.02 mCi
1.18	1.07 mCi
1.35	1.20 mCi
1.87	1.42 mCi

$$\text{Correction Factor (CF)} = \frac{\text{Net weight added to 3.0 ml syringe (reference standard point)}}{\text{Net weight added to 1.0, 5.0 and 10.0 ml syringe}}$$

CF for 1.0 ml syringe = $\frac{1.18}{1.07}$ = 1.1; CF for 5.0 ml syringe = $\frac{1.18}{1.35}$ = 0.89;
CF for 10.0 ml syringe = $\frac{1.18}{1.87}$ = 0.63

CF · $\bar{X}$ activity from the 1.0, 5.0 and 10.0 ml syringe = relative activity added

Relative activity added:	1.0 ml syringe	5.0 ml syringe
	1.1x1.02=1.12 mCi	0.87·1.20-1.04 mCi

10.0 ml syringe
0.63·1.42=0.89 mCi

7. Once the activities for all syringes have been corrected for the difference in volumes added and the relative activity added has been calculated, prepare a graph to correct for syringe size in the following manner:

   a. Find the correction factor for each syringe by dividing the mean activity from the dose for the 1.0 ml syringe by each relative activity added for the 1.0, 5.0 and 10.0 ml syringe.

Example:

	1.0 ml syringe	5.0 ml syringe	10.0 ml syringe
Correction Factors for Different Syringe sizes	$\frac{1.07 \text{ mCi}}{1.12 \text{ mCi}} = 0.95$	$\frac{1.07 \text{ mCi}}{1.04 \text{ mCi}} = 1.02$	$\frac{1.07 \text{ mCi}}{0.89 \text{ mCi}} = 1.20$

(CF for 3.0 ml syringe = $\frac{1.0}{}$)

b. Plot the correction factors for different syringe sizes vs syringe size on linear graph paper and keep graph at dose calibrator.

8. Repeat steps 2-7 from above using the TcO_4 99m stock vial (*Note: be sure to correct all activity readings for decay)

9. Place 1.0 ml from the I-131 stock vial into a 30.0 ml elution vial.

10. Assay the elution vial and record the net mean reading (the $\bar{X}$ of three (3) separate readings).

11. Add an appropriate amount of water to the elution vial to bring the total volume of solution to 2.0, 4.0, 8.0, 10.0, 15.0 and 20.0 ml's. After each addition of water (mix well), record the net mean reading for each volume ($\bar{X}$ of three (3) separate readings).

12. Select the net mean reading from the 8.0 ml volume as a reference standard, from which all other values will be compared.

13. Correction factors (CF) for differences in activity encountered for the various volumes are calculated as follows:

$$CF = \frac{\text{Net } \bar{X} \text{ activity of reference standard}}{\text{Net } \bar{X} \text{ activity of other volumes}}$$

14. Plot the correction factors vs volumes on linear graph paper. Use this graph to determine appropriate CF needed to acquire an accurate activity measurement in elution vials.

15. Repeat the above procedure (Steps 9-14) using 1.0 ml from the TcO_4 99m stock solution vial (*Note: Be sure to correct all activity readings for decay).

16. Draw, as accurately as possible, 1.0 ml from the I-131 stock solution vial into a 3.0, 5.0 and 10.0 ml syringe.

17. Record the net mean activity for each syringe ($\bar{X}$ of three (3) separate readings).

18. Add water in 1.0 ml increments to each syringe until the maximum volume for that particular syringe has been reached.

19. Take and record the net mean activity after every addition of water (X of three (3) separate readings for each volume).

20. Select the 1.0 ml reading from the 3.0 ml syringe; the 3.0 ml reading from the 5.0 ml syringe and the 5.0 ml reading from the 10.0 ml syringe as reference standards from which all correction factors will be calculated.

21. Correction factors for the different volumes will be calculated as follows:

$$\text{Correction Factors} = \frac{\text{Mean activity of reference standard}}{\text{Mean activity from other volumes}}$$

22. Plot the correction factors vs volumes for each syringe size on linear graph paper. Use this graph to determine accurate activity measurements for various syringe volumes.

23. Repeat steps 16-22 using 1.0 ml of TcO_4 99m from the stock solution vial.

ACCURACY TEST FOR DOSE CALIBRATORS

RATIONALE:

By obtaining an accurate activity value, we are more certain to administer a quantity of radioactive material that is optimal for the planned study or treatment and that does not result in excessive dose to the patient. Small overdoses probably do not measurably harm the recipient, however, these exposure doses do accumulate and thus contribute to the overall population radiation exposure. Underdoses result in less than optimal information and prolonged imaging time. This increases patient discomfort and decreases the efficiency of the department.

PROCEDURE:

1. Assay each reference standard (Cs-137; Co-60; Co-57; and Ba-133) and subtract the appropriate amount of background to determine the net activity.

2. Repeat step #1 for a total of three determinations for each standard source.

3. Determine the mean for each standard from the three activity readings.

4. The net mean activity for each standard should be less than $\pm$ 5.0% of the certified activity after decay corrections have been made.

5. Record all results in the appropriate log book.

6. Perform accuracy checks annually or whenever repairs have been made on the instrument..

7. If at any time the net mean activity for any of the standard reference sources is greater than 5.0% of the certified activity (after correction for decay), notify the Laboratory Supervisor or Chief Technologist and do not use the instrument for determining dose activity.

5 -
3 rel

ITEM 11

FACILITIES AND EQUIPMENT

Information in this record was deleted
in accordance with the Freedom of Information
Act, exemptions 2
FOIA- 2006-0238

Portions Ex 2 nn/12/9

ITEM 11 - FACILITIES AND EQUIPMENT

1. Facilities

See attached drawings of the Nuclear Medicine Pharmacy, the Radiation Therapy isotope storage room, and a typical laboratory room.

2. Equipment

The following equipment/facilities are available as required:

a. Remote Handling:

(1) Niptongs and griptongs

(2) Atomic Accessories Handling Tool RHT-60

(3) Jaws and vices

(4) Remote forceps

(5) Magnetic handlers

b. Storage Containers:

(1) Steel safes

(2) Lead lined boxes

(3) Steel drums

(4) Lead storage containers

(5) Lead pigs

c. Shielding:

(1) Portable shields

(2) Shielding materials (e.g. sheet lead, plastic sheet, etc.)

d. Instrumentation:

See Item 9 of this application

e. Ventilation Control:

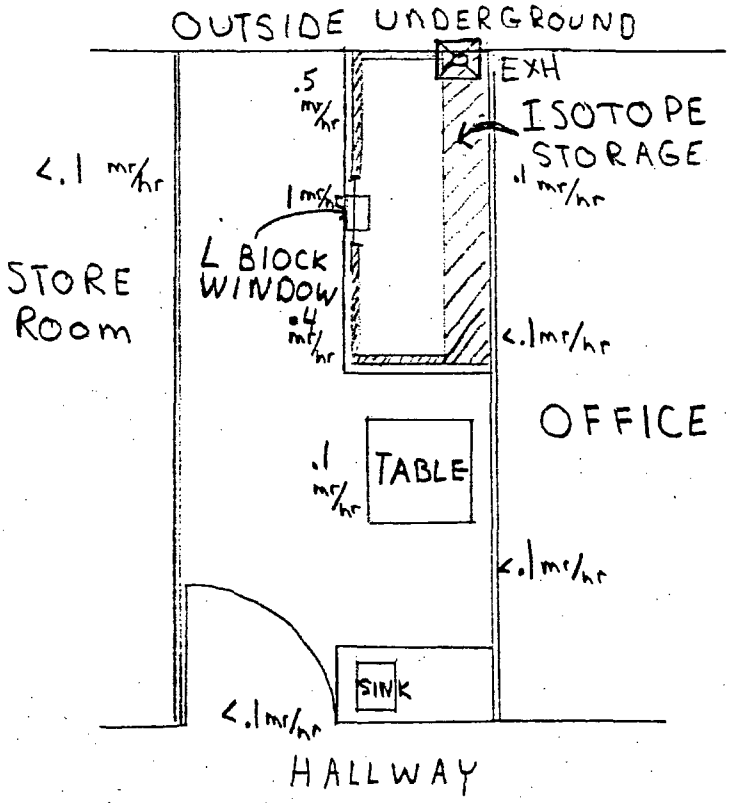
(1) Fume hoods

(2) Fume hoods with ionization boxes

(3) Fume hoods with absolute filter assemblies

RAD THERAPY ISOTOPE STORAGE

Bldg T-2
Room 13



Vent	*CFM
EXH	300

1/4" = 1'-0"

LEAD

VICTOREEN 440 SN 3008

EXHAUST

*ALNOR VELOMETER

ITEM 12

PERSONNEL TRAINING PROGRAM

hm/12-14

HEALTH PHYSICS
WALTER REED ARMY MEDICAL CENTER
Washington, D.C. 20012

MEMO #2
HSWP-QHP

9 July 1979

PERSONNEL TRAINING PROGRAM

1. Courses of Instruction given at Walter Reed Army Medical Center are as follows:

a. RADIATION SAFETY FOR SUPPORT PERSONNEL: A one-hour briefing for support personnel (e.g. clerical, housekeeping, maintenance, and security personnel) whose duties require them to be in the vicinity of radioactive materials on an infrequent basis but not to work with the materials directly. This briefing is designed to provide the support personnel with basic information on good radiation safety practices and an awareness of principle of ALARA related to their job. Program of Instruction attached.

b. RADIATION SAFETY BRIEFINGS: One-hour briefings for personnel whose duties require them to be in the vicinity of radioactive materials or to work with such material on an infrequent basis under restricted conditions. These briefings are designed to provide specific personnel with basic information on good radiation safety practices relevant to their specific duties. These briefings will be presented to personnel with specified duties involving radioactive material (e.g. Nursing personnel, Fire Department personnel, Animal Handlers). Program of Instruction attached.

c. INTRODUCTORY PRINCIPLES OF RADIATION PROTECTION: An eight (8) hour course for all personnel who work daily with radioactive materials. This course provides the minimum training required for safe practices in the storage, use and handling of radioactive materials. Program of Instruction attached.

d. ADVANCED COURSE-PRINCIPLES OF RADIATION PROTECTION: A twenty (20) hour course for "Principal Users" and "Co-Workers". Such individuals are directly responsible for the use of radioactive materials as authorized by the Radiation Control Committee. Program of Instruction attached.

2. At the discretion of the WRAMC Radiation Control Committee and the Health Physics Office, WRAMC, other courses of instruction pertinent to good radiation safety practices will be offered.

RADIATION SAFETY FOR SUPPORT PERSONNEL

PRESENTED BY: Health Physics Office, WRAMC
FOR : Support Personnel at WRAMC & Supported Activities
LENGTH : One (1) hour

I. Introductory Discussion

A. State purpose of class
1. Brief support personnel on radiation safety aspects of their job.

B. Highlight videotape - "Radiation Safety" - NUS Corporation
1. Safe procedures for support personnel
(1) For those who receive and carry radioactive materials
(2) For those who enter radiation controlled areas
(3) For those who make repairs in radiation areas
(4) For those who perform cleaning chores in radiation areas

2. The tape will specifically cover:
(1) Radiation hazards
(2) Warning signs
"Caution - Radioactive Materials"
"Radioactive - Handle Carefully"
"Caution - Radiation Area"
(3) Rules to follow when working near radioactive material
(a) Security
(b) Clerical workers entering a radioactive laboratory
(c) Maintenance personnel
(d) Custodians
(4) What to do in case of a radiation accident
(5) Your obligations and rights

II. Show videotape - "Radiation Safety" - NUS Corporation (27 min.)

III. Concluding remarks

A. Discussion of important points covered in tape and specific information relevant to the support group receiving briefing (i.e. Military/Security Police, clerical, nursing, housekeeping)

B. Questions

C. Emphasize
(1) Health Physics on call 24 hrs/day for emergencies and to answer questions
(2) Call 301-427-5107 for Duty NCO name and number
(3) If concerned, call Duty NCO

IV. Training Aids

A. Videotape - "Radiation Safety"
B. Radiation signs relevant to group receiving briefing
C. SOP's relevant to group receiving briefing
D. Appropriate appendix to this lesson plan relevant to particular support group

RADIATION SAFETY BRIEFINGS

PRESENTED BY: Health Physics Office, WRAMC
FOR : Fire Department Personnel
Nursing Personnel
Animal Handlers
LENGTH : One (1) hour

TOPICS

1. Radiation Hazards
2. Radioactive Material Usage and Radiation Areas at WRAMC and Supported Activities
3. Radiation Safety Principles: Time, Distance, Shielding; ALARA
4. Warning Signs
5. Radiation Detection Instruments
6. Personnel Dosimetry
7. Radiation Safety Procedures relevant to Specific Personnel Receiving Briefing (e.g. Fire Department Personnel, Nursing Personnel, Animal Handlers)
8. Emergency Procedures

INTRODUC. .Y PRINCIPLES OF RADIATION PRC. .CTION

PRESENTED BY: Health Physics Office, WRAMC
FOR : Radiation Workers at WRAMC, supported Activities
LENGTH : Eight (8) hours

	SUBJECT	TIME	DESCRIPTION/CONTENT
1.	Course Introduction	30 min.	Brief overview of the scope and purpose of course. WRAMC Radiation Safety Program.
2.	Characteristics of Ionizing Radiation	45 min.	Sources of radiation (natural vs man-made) Descriptions of alpha particles, beta particles, and gamma rays (origin, mass, charge, length of travel, etc.)
3.	Units of Radiation Dose and Quantities	30 min.	Units of activity, half life, specific activity; units of dose, rad roentgen, rem.
4.	Biological Hazards of Ionizing Radiation	105 min.	Radiation effects on biological systems and human response to radiation exposures. Potential hazards associated with radioactive material.
5.	Personnel Dosimetry	30 min.	Types of personnel dosimeters, film badge construction, proper wear of the film badge, interpretation of film exposure. Personnel dosimeters, bioassay, right of workers to be informed of radiation exposure and bioassay results.
6.	Radiation Detection Instrumentation	60 min.	Selection of appropriate survey instrument; demonstration of correct use of beta-gamma, alpha survey instruments.
7.	Safety Procedures in Radioisotope Use	60 min.	Radiological safety procedures, hazards involved in radioisotope use, guidelines for safe use. Preparation of work areas, clean up, and monitoring. Principles of time, distance, and shielding. Obligation of worker to report unsafe condition.
8.	Emergency Procedures	30 min	Appropriate response to emergency situations.
9.	Exam/Critique	30 min.	Multiple choice exam on course content. Critique of exam.
10.	Closing Summary	30 min.	Restatement of purpose of course, WRAMC Radiation Safety Program, role of HPO. Give phone numbers and people to contact.

ADVANCED COURSE: PRINCIPLES OF RADIATION PROTECTION

PRESENTED BY: Health Physics Office, WRAMC
FOR : "Principal Users" and "Co-Workers" at WRAMC, Supported Activities
LENGTH : 20 hours

	SUBJECT	TIME	DESCRIPTION/CONTENT
1.	Prerequisite: "Introductory Principles of Radiation Protection"	480 min	See Course Outline
2.	Sources of Radiation and Potential Hazards Associated with Radioactive Material	60 min	Sources of Radiation from consumer products and common laboratory equipment, radiation used at WRAMC and areas where radioactive material is used or stored. Potential hazards associated with radioactive materials.
3.	External Sources of Radiation	160 min	Radiation therapy-dose/effect; Research areas - exposures; Personnel Dosimetry; Radiation Protection-Time, Distance, Shielding calculations, maximum permissible exposure levels; ALARA.
4.	Internal Exposure	160 min	Nuclear Medicine-dose/effect; Sources of Internal Exposures in Research and medical areas; Bioassay; Dose estimates; radiation protection and maximum permissible exposure levels; ALARA.
5.	Emergency Planning and Procedures; Response to Unsafe Conditions	120 min	Plans, Instructions, and appropriate personnel response to emergencies or unsafe conditions.
6.	Responsibilities/Rules/Regulations	30 min	Responsibilities of Authorized Users of Radioactive Materials; Dept of Army, NRC, FDA, and WRAMC rules/regulations with respect to radioactive materials; instructions to workers.
7.	Special Topics in Radiation Protection	130 min	Topics include: Instrumentation, mathematics pertaining to the Use and Measurement of Radioactivity; Radiation Biology; and Radiopharmaceutical chemistry.
8.	Practicum	60 min	Demonstration by student of understanding of subject material.

ITEM 13-PROCEDURES FOR ODERING AND RECEIVING RADIOACTIVE MATERIAL

ITEM 14-PROCEDURES FOR SAFELY OPENING PACKAGES CONTAINING RADIOACTIVE MATERIALS

HEALTH PHYSICS
WALTER REED ARMY MEDICAL CENTER
Washington, D.C. 20012

HSWP-QHP
MEMO #6

12 July 1979

PROCEDURES FOR ORDERING, RECEIVING AND SAFELY OPENING PACKAGES CONTAINING RADIOACTIVE MATERIAL

1. GENERAL Radioactive material for Walter Reed Army Medical Center (WRAMC) and tenant activities will be ordered, received and secured in accordance with U.S. Army Regulations, Title 10, Code of Federal Regulations, and the provisions of WRAMC's Nuclear Regulatory Commission License.

2. HEALTH PHYSICS OFFICE RESPONSIBILITIES The Health Physics Office is responsible for assuring that all radioactive material is ordered and received in accordance with the above directives.

3. PRINCIPAL USER'S RESPONSIBILITIES WRAMC Principal Users are responsible for ordering and receiving radioactive material in accordance with the enclosed instructions (Annexes A & B).

4. MILITARY POLICE'S RESPONSIBILITIES WRAMC Military Police are responsible for receiving radioactive materials delivered during non-duty hours in accordance with the enclosed instructions (Annex B).

ROBERT M. QUILLIN
LTC, MSC
Health Physics Officer

2 Incls
1. Annex A-Procedures for Procurement of Radioactive Material
2. Annex B-Procedures for Receiving and Safely Opening Packages Containing Radioactive Material

This Memo supersedes SOP 4-2, dated 31 October 1977.

HEALTH PHYSICS
WALTER REED ARMY MEDICAL CENTER
Washington, D.C. 20012

HSWP-QHP
MEMO #6
Annex A

12 July 1979

PROCEDURES FOR PROCUREMENT OF RADIOACTIVE MATERIAL

ANNEX A

1. GENERAL

a. A Principal User may procure for use at WRAMC only those radioisotopes currently authorized for his use by the WRAMC Radiation Control Committee, subject to the limitations of his authorization.

b. Unless specific prior arrangements have been made with the Health Physics Officer, the maximum quantity which may be ordered at any one time is limited by the maximum activity of that radioisotope which the User is authorized to possess less the amount of activity the user will have on hand at the time the new order is received.

c. Specific prior approval of the Health Physics Officer shall be required before receiving and/or transfering gifts containing radioactive material. This particular application pertains to those instances where normal supply channels are not utilized. All gifts will be delivered to the locations shown in para. 5 (2)b.

2. ORDERING PROCEDURES

a. The Principal User shall submit a completed DA Form 3953 (Purchase Request and Commitment) through normal supply channels for the procurement of all radioactive materials.

b. In addition to the information required by WRAMC Procurement Regulations, each DA Form 3953 shall contain the following:

(1) Radionuclide, chemical form, and total activity (Activity is given

as microcurie (uCi), millicurie (mCi), or curie (Ci); for natural radioactive materials microgram (ug), milligram (mg), gram (g), or kilogram (kg) may be used; for radium equivalent sources such as Cesium-137 milligram radium equivalent (mg Ra eq) may be used where appropriate).

(2) The WRAMC Radioisotope Authorization Number will be indicated in the "Attention Line" of the "Ship To" address.

(3) Date required or delivery date

(4) Instructions to the vendor to ship to the location shown in para (5) below.

(5) One of the proper shipping addresses designated below:

(a) For items to be delivered by mail:

Health Physics Officer
Bldg 188, Forest Glen Section
Walter Reed Army Medical Center
ATTN: Authorization No. _____
Washington, D.C. 20012

(b) For items to be delivered by all other means:

Health Physics Officer
Bldg 188, 2681 Linden Lane
Forest Glen Section
Walter Reed Army Medical Center
ATTN: Authorization No. _____
Silver Spring, Maryland

(c) For item destined for USAMRIID, Ft. Detrick, Maryland

Radiation Protection Officer
US Army Medical Research Institute of Infectious Diseases
South Loading Dock, Bldg 1425
Fort Detrick
Fredrick, Maryland 21701

(d) For any item destined for Andrew Rader Clinic, Ft. Myer, Virginia:

Andrew Rader Army Clinic
Bldg 1425
Ft. Myer, Virginia 22211

(e) For any item destined for Army Medical Laboratory, Ft. Meade Maryland:

Radiation Protection Officer
Army Medical Laboratory
Building 2490
Ft. Meade, Maryland 20755

c. Any item requiring special handling or pick-up by the Health Physics Office, WRAMC, must be coordinated with the Health Physics Officer. Principal Users are responsible for notifying the Radioactive Materials Control Branch, Health Physics Office (427-5104) when any order for radioactive materials is placed for quantities in excess of the "Exempt Quantity Limits" with exceptions listed in Appendix 2, Annex B; or when any order for radioactive materials is placed for quantities in excess of the "Type A Quantity Limits" listed in Appendix 2, Annex B. Any questions concerning these limits should be directed to the Radioactive Materials Control Branch (427-5104).

HEALTH PHYSICS
WALTER REED ARMY MEDICAL CENTER
Washington, D.C. 20012

HSWP-QHP
MEMO #6
Annex B

PROCEDURES FOR RECEIVING AND SAFELY OPENING
PACKAGES CONTAINING RADIOACTIVE MATERIAL

1. GENERAL

a. All incoming shipments of radioactive material to Walter Reed Army Medical Center will be received by the Health Physics Office during duty hours, or by the Military Police, WRAMC Forest Glen Section during non-duty hours. Shipments to Fort Detrick, Ft. Meade or Ft. Myer will be delivered to the address shown in Annex A.

b. All incoming packages of radioactive material will be examined for damage immediately upon receipt. Any packages that appear to be wet, punctured, crushed, or otherwise damaged will be considered to be contaminated. Do not handle such packages. Follow the instructions contained in paragraph 3, Appendix 1 to this Annex.

c. Incoming radioactive material shipments must be continuously secured against unauthorized removal and the radiation levels adjacent to the secured storage area may not exceed the limits in Paragraph 20.105, Title 10, Code of Federal Regulations, Part 20.

d. Unless prior approval has been granted by the Health Physics Office all WRAMC incoming shipments will be secured in the following areas:

(1) Normal Duty Hours: Health Physics Office, Bldg 188, WRAMC, FGS

(2) Non-Duty Hours: Bldg 149-A, WRAMC, FGS

e. Approved receiving areas will be posted with the appropriate caution signs as specified in Paragraph 20.203, Title 10, Code of Federal Regulations,

Part 20.

f. No incoming shipment of radioactive material may be refused when delivered.

2. SHIPMENT MONITORING & DELIVERY TO AUTHORIZED RECIPIENTS

a. Each package containing more than an "Exempt Quantity" of radioactive material (less exceptions) as specified in Appendix 2 of this Annex shall be monitored by the Health Physics Office for removable contamination within three (3) hours after it is received, if received during normal duty hours or within eighteen (18) hours after it is received, if received during non-duty hours. If removable radioactive contamination in excess of 0.01 microcuries (22,000 disentegrations per minute) per 100 square centimeters of package surface is found on the external surface of the package, the Health Physics Office shall immediately notify the final delivering carrier and the Nuclear Regulatory Commission Inspection and Enforcement Office for Region 1 (215/337-1150).

b. Each package containing quantities of radioactive material in excess of the "Type A Quantities" specified in Appendix 2 of this Annex shall be monitored by the Health Physics Office within three (3) hours after it is received, if received during normal duty hours, or within eighteen (18) hours after it is received, if received during non-duty hours. If radiation levels found on the external surface of the package are in excess of 200 millirem per hour, or at three (3) feet from the external surface of the package are in excess of 10 millirem per hour, the Health Physics Office shall immediately notify the final delivering carrier and the Nuclear Regulatory Commission Inspection and Enforcement Office for Region 1 (215/337-1150).

c. All shipments of radioactive material will be inspected by the Health Physics Office to insure that the shipment does not exceed the possession limits of the Auth-

orization under which it is ordered. Unauthorized shipments will be returned to the vendor when possible, disposed of as radioactive waste, or held until the Principal User obtain an amended Radioactive Material Authorization allowing receipt of the material. Unauthorized shipments will not be held by Health Physics for more than ninety (90) days.

d. The following package opening procedure will be utilized by Health Physics personnel:

(1) Put on gloves.

(2) Open outer package (following manufacturer's directions if supplied) and remove packing slip. Open inner package and verify that the contents are as listed on the packing slip.

(3) Check integrity of source container: inspecting for breakage of seals or vials, loss of liquid, discoloration of packaging material, etc.

(4) Perform a wipe test on the external surface of the final source container when a shipment requires contamination surveys of the external surface of the shipping package (See Appendix 2).

3. FINAL SOURCE CONTAINER CHECK

The Principal User is responsible for making a check of the final radioactive materials source container. This check will follow the steps outlined in sub paragraph 2d(1) through (3) above. In addition the Principal User will perform a wipe test of the final source container upon receipt to determine if contamination is present.

HEALTH PHYSICS
WALTER REED ARMY MEDICAL CENTER
Washington, D.C. 20012

HSWP-QHP
MEMO #6 (Annex B, Appendix 1)

RECEIPT OF RADIOACTIVE MATERIAL SHIPMENTS BY MILITARY POLICE DURING NON-DUTY HOURS

1. GENERAL. Federal law requires that certain categories of radioactive material shipments be monitored by the Health Physics Office within eighteen (18) hours of receipt. To meet the requirement, all radioactive material shipments will be received by the Military Police, WRAMC, Forest Glen Section.

2. RECEIVING INSTRUCTIONS. Military Police personnel receiving shipments will:

a. Annotate the shipping receipt with his/her name, time and date received.

b. Maintain all shipping receipts at the Military Police Station, FGS until picked up by Health Physics personnel.

c. Examine each package for damage immediately upon receipt.

d. If the package is undamaged, take it to Building 149-A, unlock door, place package in the refrigerator located immediately to the left of the door and relock the entrance door.

3. SAFETY PROCEDURES FOR DAMAGED PACKAGES. Any package that appears to be wet, punctured, crushed or otherwise damaged requires the following action:

a. Call the Health Physics Office Duty NCO immediately (TELEPHONE: 427-5107).

b. Ask the carrier to remain at the Military Police Station, WRAMC, FGS until it can be determined that neither he/she nor the delivery vehicle is contaminated.

c. Do not handle the package. Place a large piece of plastic sheeting on the floor. Put a piece of absorbent paper on the plastic (paper side up if backed). Have the carrier put on a pair of gloves and place the package on the absorbent paper.

d. Do not allow personnel to occupy the same room in which the package is located until the Health Physics Office Duty NCO determines that no safety hazard exists.

HEALTH PHYSICS
WALTER REED ARMY MEDICAL CENTER
Washington, D.C. 20012

HSWP-QHP
MEMO #6
Annex B
Appendix 2

QUANTITIES OF RADIOACTIVE MATERIAL EXEMPTED FROM SHIPMENT MONITORING

1. Certain shipments of radioactive materials are exempted from the monitoring procedures required by Paragraph 20.205, Title 10, Code of Federal Regulations, Part 20.

2. The following shipments are not required to be monitored for radioactive contamination and excessive radioactive exposure rates.

a. Packages containing no more than the exempt quantities shown in the table in paragraph 3 below:

b. Packages containing no more than 10 mCi of radioactive material consisting solely of 3-H, 14-C, 35-S or 125-I.

c. Packages containing only radioactive material as gases or in special form.

d. Packages containing only radioactive material in other than liquid form (including Mo-99/Tc 99m generator) and not exceeding the Type A quantity limit specified in the table below.

e. Packages containing only radionuclides with half-lives of less than 30 days and a total quantity of no more than 100 millicuries.

3. Table of Exempt and Type A Quantities

Transport Group*	Exempt Quantity Limit (In millicuries)	Type A Quantity Limit (In curies)
I	0.01	0.001
II	0.1	0.050
III	1.0	3
IV	1.0	20
V	1.0	20
VI	1.0	1000
VII	25,000.0	1000

* A Table of Radioactive Material Transport Groups is set forth in Appendix C, Title 10, Code of Federal Regulations, Part 71 (attached).

Americium (95)	Am 241	I
	Am 242	I
	Am 243	I
Argon (18)	Ar 37	V
	Ar 39	V
	Ar 41	II
	Ar 41 (uncompressed) **	V
Arsenic (33)	As 73	IV
	As 74	IV
	As 76	IV
	As 77	IV
Astatine (85)	At 211	III
Barium (56)	Ba 131	IV
	Ba 133	II
	Ba 140	III
Berkelium (97)	Bk 249	I
Beryllium (4)	Be 7	IV
Bismuth (83)	Bi 206	IV
	Bi 207	III
	Bi 210	II
	Bi 212	III
Bromine (35)	Br 82	IV
Cadmium (48)	Cd 109	IV
	Cd 115 m	III
	Cd 115	IV
Calcium (20)	Ca 45	IV
	Ca 47	IV
Californium (98)	Cf 249	I
	Cf 250	I
	Cf 252	I
Carbon (6)	C 14	IV
Cerium (58)	Ce 141	IV
	Ce 143	IV
	Ce 144	III
Cesium (55)	Cs 131	IV
	Cs 134 m	III
	Cs 134	III
	Cs 135	IV
	Cs 136	IV
	Cs 137	III
Chlorine (17)	Cl 36	III
	Cl 38	IV
Chromium (24)	Cr 51	IV
Cobalt (27)	Co 56	III
	Co 57	IV
	Co 58 m	IV
	Co 58	IV
	Co 60	III
Copper (29)	Cu 64	IV
Curium (96)	Cm 242	I
	Cm 243	I
	Cm 244	I
	Cm 245	I
	Cm 246	I
Dysprosium (66)	Dy 154	III
	Dy 165	IV
	Dy 166	IV
Erbium (68)	Er 169	IV
	Er 171	IV
Europium (63)	Eu 150	III
	Eu 152 m	IV
	Eu 152	III
	Eu 154	II
	Eu 155	IV
Fluorine (9)	F 18	IV
Gadolinium (64)	Gd 153	IV
	Gd 159	IV
Gallium (31)	Ga 67	III
	Ga 72	IV
Germanium (32)	Ge 71	IV
Gold (79)	Au 193	III
	Au 194	III
	Au 195	III
	Au 196	IV
	Au 198	IV
	Au 199	IV
Hafnium (72)	Hf 181	IV
Holmium (67)	Ho 166	IV
Hydrogen (1)	H 3 (see tritium)	
Indium (49)	In 113 m	IV
	In 114 m	III
	In 115 m	IV
	In 115	IV
Iodine (53)	I 124	III
	I 125	III
	I 126	III
	I 129	III
	I 131	III
	I 132	IV
	I 133	III
	I 134	IV
	I 135	IV

Iridium (77)	Ir 192	II
	Ir 194	II
Iron (26)	Fe 55	IV
	Fe 59	IV
Krypton (36)	Kr 85 m	V
	Kr 85 (uncompressed) **	III
	Kr 85 (uncompressed) **	VI
	Kr 87	II
	Kr 87 (uncompressed) **	V
Lanthanum (57)	La 140	IV
Lead (82)	Pb 203	IV
	Pb 210	II
	Pb 212	II
Lutecium (71)	Lu 172	III
	Lu 177	IV
Magnesium (12)	Mg 28	III
Manganese (25)	Mn 52	IV
	Mn 54	IV
	Mn 56	IV
Mercury (80)	Hg 197 m	IV
	Hg 197	IV
	Hg 203	IV
Mixed fission products MFP.		II
Molybdenum (42)	Mo 99	IV
Neodymium (60)	Nd 147	IV
	Nd 149	IV
Neptunium (93)	Np 237	I
	Np 239	I
Nickel (28)	Ni 56	III
	Ni 59	IV
	Ni 63	IV
	Ni 65	IV
Niobium (41)	Nb 93 m	IV
	Nb 95	IV
	Nb 97	IV
Osmium (76)	Os 185	IV
	Os 191 m	IV
	Os 191	IV
	Os 193	IV
Palladium (46)	Pd 103	IV
	Pd 109	IV
Phosphorus (15)	P 32	IV
Platinum (78)	Pt 191	IV
	Pt 193	IV
	Pt 193 m	IV
	Pt 197 m	IV
	Pt 197	IV
Plutonium (94)	Pu 238 (F)	I
	Pu 239 (F)	I
	Pu 240	I
	Pu 241 (F)	I
	Pu 242	I
Polonium (84)	Po 210	I
Potassium (19)	K 42	IV
	K 43	III
Praseodymium (59)	Pr 142	IV
	Pr 143	IV
Promethium (61)	Pm 147	IV
	Pm 149	IV
Protactinium (91)	Pa 230	I
	Pa 231	I
	Pa 233	II
Radium (88)	Ra 223	II
	Ra 224	II
	Ra 226	I
	Ra 228	I
Radon (86)	Rn 220	IV
	Rn 222	II
Rhenium (75)	Re 183	IV
	Re 186	IV
	Re 187	IV
	Re 188	IV
	Re Natural	IV
Rhodium (45)	Rh 103 m	IV
	Rh 105	IV
Rubidium (37)	Rb 86	IV
	Rb 87	IV
	Rb Natural	IV
Ruthenium (44)	Ru 97	IV
	Ru 103	IV
	Ru 105	IV
	Ru 106	III
Samarium (62)	Sm 145	III
	Sm 147	III
	Sm 151	IV
	Sm 153	IV
Scandium (21)	Sc 46	III
	Sc 47	IV
	Sc 48	IV

Selenium (34)	Se 75	IV
Silicon (14)	Si 31	IV
Silver (47)	Ag 105	IV
	Ag 110 m	III
	Ag 111	IV
Sodium (11)	Na 22	III
	Na 24	IV
Strontium (38)	Sr 85 m	IV
	Sr 85	IV
	Sr 89	III
	Sr 90	II
	Sr 91	III
	Sr 92	IV
Sulphur (16)	S 35	IV
Tantalum (73)	Ta 182	III
Technetium (43)	Tc 96 m	IV
	Tc 96	IV
	Tc 97 m	IV
	Tc 97	IV
	Tc 99 m	IV
	Tc 99	IV
Tellurium (52)	Te 125 m	IV
	Te 127 m	IV
	Te 127	IV
	Te 129 m	III
	Te 129	IV
	Te 131 m	III
	Te 132	IV
Terbium (65)	Tb 160	III
Thallium (81)	Tl 200	IV
	Tl 201	IV
	Tl 202	IV
	Tl 204	III
Thorium (90)	Th 227	II
	Th 228	I
	Th 230	I
	Th 231	I
	Th [illegible]	[illegible]
	Th 234	II
	Th Natural	III
Thulium (69)	Tm 168	III
	Tm 170	III
	Tm 171	IV
Tin (50)	Sn 113	IV
	Sn 117 m	III
	Sn 121	III
	Sn 125	IV
Tritium (1)	H 3	IV
	H 3 (as a gas, as luminous paint, or adsorbed on solid material)	VII
Tungsten (74)	W 181	IV
	W 185	IV
	W 187	IV
Uranium (92)	U 230	II
	U 232	I
	U 233 (F)	II
	U 234	II
	U 235 (F)	III
	U 236	II
	U 238	III
	U Natural	III
	U Enriched (F)	III
	U Depleted	III
Vanadium (23)	V 48	IV
	V 49	III
Xenon (54)	Xe 125	III
	Xe 131 m	III
	Xe 131 m (uncompressed). **	V
	Xe 133	III
	Xe 133 (uncompressed). **	VI
	Xe 135	II
	Xe 135 (uncompressed). **	V
Ytterbium (70)	Yb 175	IV
Yttrium (39)	Y 88	III
	Y 90	IV
	Y 91 m	III
	Y 91	III
	Y 92	IV
	Y 93	IV
Zinc (30)	Zn 65	IV
	Zn 69 m	IV
	Zn 69	IV
Zirconium (40)	Zr 93	IV
	Zr 95	III
	Zr 97	IV

ITEM 15

GENERAL RULES FOR THE SAFE USE OF RADIOACTIVE MATERIAL

HEALTH PHYSICS
WALTER REED ARMY MEDICAL CENTER
Washington, D.C. 20012

HSWP-QHP
MEMO #5

5 July 1979

GENERAL RULES FOR THE SAFE USE OF RADIOACTIVE MATERIAL

1. Following are general rules for the safe use of radioactive materials:

   a. Wear laboratory coats or other protective clothing at all times in areas where radioactive materials are used.

   b. Wear disposable gloves at all times while handling radioactive materials.

   c. Monitor hands and clothing for contamination after each procedure or before leaving the area.

   d. Do not eat, drink, smoke, or apply cosmetics in any area where radioactive material is stored or used.

   e. Wear assigned personnel monitoring device(s) at all times while in areas where radioactive materials are used or stored. Whole body monitoring device(s) should be worn at chest or waist level.

   f. Dispose of radioactive waste only in specially designated receptacles.

   g. Never pipette by mouth.

   h. Confine radioactive solutions in covered containers plainly identified and labeled with name of compound, radionuclide, date, activity, and radiation level, if applicable.

   i. Always transport radioactive materials in appropriate shielding containers.

2. Following are additional general rules specifically applicable to preparation and use of radioactive materials for human use.

   a. Use syringe shields for preparation of patient doses and administration to patients except in circumstances such as pediatric cases when their use would compromise the patient's well-being.

   b. Assay each patient dose in the dose calibrator prior to administration. Do not use any doses that differ from the prescribed dose by more than 10%.

   c. Wear TLD finger badges during elution of generator and preparation, assay, and injection of radiopharmaceuticals.

   d. Survey generator, kit preparation, and injection areas for contamination after each procedure or at the end of the day. Decontaminate if necessary.

HSWP-QHP
MEMO #5

5 July 1979

ROBERT M. QUILLIN
LTC, MSC
Health Physics Officer

ITEM 16

EMERGENCY PROCEDURES

HEALTH PHYSICS
WALTER REED ARMY MEDICAL CENTER
Washington, D.C. 20012

HSWP-QHP
MEMO #11

13 July 1979

EMERGENCY PROCEDURES

1. MINOR SPILLS.

a. Notify: Notify persons in the area that a spill has occurred.

b. Prevent the Spread: Cover the spill with absorbent paper.

c. Clean Up: Use disposable gloves and remote handling tongs. Carefully fold the absorbent paper and pad. Insert into a plastic bag and dispose of in the radioactive waste container. Also insert into the plastic bag all other contaminated materials such as disposable g oves.

d. Survey: With a low-range, thin-window G-M survey meter, check the area around the spill, hands, and clothing for contamination.

e. Report: Report incident to the Health Physice Officer.

2. MAJOR SPILLS.

a. Clear the Area: Notify all persons not involved in the spill to vacate the room.

b. Prevent the Spread: Cover the spill with absorbent pads, but do not attempt to clean it up. Confine the movement of all personnel potentially contaminated to prevent the spread.

c. Shield the Source. If possible, the spill should be shielded, but only if it can be done without further contamination or without significantly increasing your radiation exposure.

d. Close the Room: Leave the room and lock the door(s) to prevent entry.

e. Call for Help: Notify the Health Physics Officer immediately.

f. Personnel Decontamination: Contaminated clothing should be removed and stored for further evaluation by the Health Physics Officer. If the spill is on the skin, flush thoroughly and then wash with mild soap and lukewarm water.

g. IN CASE OF EMERGENCY: Contact the Health Physics Officer at 427-5107/5104.

ROBERT M. QUILLIN
LTC, MSC
Health Physics Officer

ITEM 17

AREA SURVEY PROCEDURES

HEALTH PHYSICS
WALTER REED ARMY MEDICAL CENTER
Washington, D.C. 20012

HSWP-QHP
MEMO #12

16 July 1979

AREA SURVEY PROCEDURES

1. All elution, preparation, and injection areas will be surveyed daily with a low-range thin-window G-M survey meter and decontaminated if necessary.

2. Laboratory areas where only small quantities of radioactive material are used (less than 100 uCi) will be surveyed monthly.

3. All other laboratory areas will be surveyed weekly.

4. The weekly and monthly survey will consist of:

a. A measurement of radiation levels with a survey meter sufficiently sensitive to detect 0.1 mRem/hr.

b. A series of wipe tests to measure contamination levels. The method for performing wipe tests will be sufficiently sensitive to detect 100 dpm per 100 cm^2 for the contaminant involved.

5. A permanent record will be kept of all survey results, including negative results. The record will include:

a. Location, date, and type of equipment used.

b. Name of person conducting the survey.

c. Drawing of area surveyed, identifying relevant features such as active storage areas, active waste areas, etc.

d. Measured exposure rates, keyed to location on the drawing (point out rates that require corrective action).

e. Detected contamination levels, keyed to locations on drawing.

f. 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.

6. Area will be cleaned if the contamination level exceeds 100 dpm/100 cm^2.

ROBERT M. QUILLIN
LTC, MSC
Health Physics Officer

12

ITEM 18

WASTE DISPOSAL

mm/12/m

HEALTH PHYSICS
WALTER REED ARMY MEDICAL CENTER
Washington, D.C. 20012

HSWP-QHP
MEMO #3

12 July 1979

RADIOACTIVE WASTE MANAGEMENT AND CONTROL

1. GENERAL Radioactive waste from Walter Reed Army Medical Center (WRAMC) and tenant activities will be controlled, packaged and disposed of in accordance with AR 755-15, "Disposal of Supplies and Equipment-Disposal of Unwanted Radioactive Material"; Title 10, Code of Federal Regulations; Title 49, Code of Federal Regulations; the WRAMC Nuclear Regulatory Commission License; and the applicable provisions of State Government Nuclear Regulation Licenses which delineate the criteria for the receipt and disposal of radioactive wastes within those states.

2. HEALTH PHYSICS OFFICE RESPONSIBILITIES The Health Physics Office is responsible for assuring that all radioactive waste is disposed of in accordance with the above directives.

3. PRINCIPAL USER'S RESPONSIBILITIES Principal Users of radioactive materials at WRAMC are responsible for the collection and handling of radioactive waste in accordance with the enclosed instructions (Annexes A-D).

ROBERT M. QUILLIN
LTC, MSC
Health Physics Officer

4 Incls
1. Annex A-Radioactive Waste Control in Laboratory/Clinic
2. Annex B-Release of Radioactivity Into The Sanitary Sewage System
3. Annex C-Collection, Local Transportation & Storage of Radioactive Waste
4. Annex D-Radioactive Waste Disposal Supplies

This Memo supersedes Memo #3, dated 31 May 1974.

HEALTH PHYSICS
WALTER REED ARMY MEDICAL CENTER
Washington, D.C. 20012

HSWP-QHP
MEMO #3
Annex A

12 July 1979

RADIOACTIVE WASTE CONTROL IN THE LABORATORY/CLINIC

ANNEX A

1. Principal Users are responsible for assuring that radioactive waste resulting from the conduct of authorized procedures is controlled in a manner that meets the safety/security measures prescribed by US Army, Federal, and applicable Sate Regulations. All Users of radioactive materials are responsible for:

a. Segregating their radioactive waste into the categories listed below:

(1) Solid, combustible

(2) Solid, non-combustible

(3) Liquid, combustible

(4) Liquid, non-combustible

(5) Gas, combustible

(6) Gas, non-combustible

(7) Animal carcasses and/or animal waste

(8) Short half-life materials (8 days half-life or less)

(9) Special materials (e.g. Bactec vials, liquid scintillation vials)

b. Limiting the non-radioactive waste which is intermixed with radioactive waste to an absolute minimum.

c. Removing or obliterating all labels on non-radioactive vendor shipping packages and on radioactive waste that has been held for decay to background level before such waste is placed in the normal trash. The determination that radioactive waste has reached background level will be made using a thin-window beta-gamma meter.

d. Storing used Mo-99/Tc-99m generators and other items of equipment containing radioactive materials in designated areas only. The radiation labels will be removed on such items only when they reach background levels. When they reach background levels, they can be disposed of as normal trash; otherwise they must be disposed of as radioactive waste.

e. Maintaining their inventory of radioactive waste to a practical minimum.

f. Controlling radioactive waste in their work areas to prevent unauthorized disposal by the custodial service. Magenta plastic bags will be used to hold radioactive waste. Magenta bags will not be used for other purposes.

g. Insuring that radioactive waste is not disposed of by incineration or burial.

h. Marking all radioactive waste containers with the radiation caution symbol and the words "Caution-Radioactive Waste" and/or "Caution-Radioactive Material".

i. Insuring that radioactive material is not released into the sanitary sewage system from holding tanks or other storage containers without the specific approval of the Health Physics Officer.

j. Disposing of radioactive waste via laboratory sinks into the sanitary sewage system only when it is determined by the Health Physics Office that it is feasible to establish the controls delineated in Annex C of this memorandum.

2. All users of radioactive materials will package their materials for disposal as follows:

a. Solid radioactive wastes shall be placed in double magenta plastic bags or a receptacle lined with double magenta plastic bags. When full, the bags will be

taped closed. The bags will be tagged with the user's identification and information concerning the contents, isotope(s) and activity. If plastic bags are used for radioactive waste containing Tritium, they will be placed inside of a Kraft paper bag.

b. Liquid waste that is retained for disposal shall be collected in plastic bottles or sealed in cans to diminish the breakage hazard. However, liquid waste that will chemically react with plastic and liquid waste containing Tritium should be placed in glass bottles. All bottle caps should be taped prior to placing them in an appropriate radioactive material container for transfer to the Health Physics Office. The bottle or can will be marked with the user's identification and information concerning the contents.

c. Scintillation vials shall be packaged separately from other materials. They will be placed unopened in double magenta plastic bags. Care must be taken to prevent breakage of the vials while in the plastic bags. The bags will be tagged as previously indicated.

d. Bactec vials shall be packaged separately from other materials. They will be autoclaved prior to transfer to radioactive waste. Bactec vials will be placed in double magenta plastic bags. These vials will not be opened as part of the waste disposal process. Care must be taken to prevent breakage of the plastic bags. The bags will be tagged as previously indicated.

e. All broken glassware, vials, bottles, tubes and similar items must be packaged in double magenta plastic bags and then placed in small cardboard boxes with tops. The bags and the box will be tagged as previously indicated.

f. Radioactive gases for disposal will not be transferred to the Health Physics Office without the prior coordination with the Radioactive Materials Control Branch.

g. Short half-life materials and items contaminated with short half-life materials shall be separated from other materials, providing there is no chemical or biological hazard involved. All radioactive warning labels must be defaced on all vials and materials prior to placing the items in the double magenta plastic bags. The bags will be tagged as previously indicated.

h. Biological wastes (e.g. carcasses) shall be prepared and packaged in accordance with the requirements of the waste disposal facility. Specific instructions will be furnished depending upon the facility to which the waste shall be shipped.

HEALTH PHYSICS
WALTER REED ARMY MEDICAL CENTER
Washington, D.C. 20012

HSWP-QHP
MEMO #3

12 July 1979

RELEASE OF RADIOACTIVITY INTO THE SANITARY SEWAGE SYSTEM

ANNEX B

1. Liquid waste will be disposed of in the sanitary sewage system in accordance with 20.303 of 10 CFR 20 and paragraph 2 of this Annex.

2. The following policy and procedures apply to all individuals desiring to release radioactive material into the sanitary sewage system via laboratory sinks:

a. Such release approval must be specifically included in the Principal Users WRAMC Authorization.

b. The sink through which the material is discharged must be conspicuously posted with a sign bearing the Radiation Caution Symbol and the words, "Caution-Radioactive Material Disposal Sink".

c. The sink must be posted with a notice to the user that the radioactive material discharged through the sink must be readily soluble or dispersible in water and does not contain any substance which is hazardous to health or will result in substantial harm to domestic animals, fish, shellfish or wildlife.

d. A record of the identity and activity of material discharged through the sink must be maintained by the user. All releases must be documented by date, time, location, isotope and total activity. This data will be reviewed for compliance and the total gross activity released recorded.

e. The material must be essentially neutral, i.e., pH of 6.0-8.0.

f. The quantity of any material released by the user in any one day will not exceed the limits established by the Health Physics Officer.

3. Daily release by Walter Reed Army Medical Center is limited by the average daily sewage flow of 5×10^9ml. Release at Ft. Meade, Ft. Myer and/or Ft. Detrick would be limited by the sewage flow for those posts. Total yearly release will not exceed 3 curies at Walter Reed Army Medical Center.

HEALTH PHYSICS
WALTER REED ARMY MEDICAL CENTER
Washington, D.C. 20012

HSWP-QHP
MEMO #3

12 July 1979

COLLECTION, LOCAL TRANSPORTATION AND STORAGE OF RADIOACTIVE WASTE

ANNEX C

1. Properly packaged radioactive waste will be brought to a centralized location in Building 40, Walter Reed Army Institute of Research; Building 2, Walter Reed Army Medical Center; Building T-2, Walter Reed Army Medical Center; Building 2490, Ft. Meade or Building 525, Ft. Myer as appropriate. Under the supervision of the Health Physics Office, wastes will be placed in barrels or other required containers. Wastes for disposal must be categorized as listed in Annex A. Waste that has not been properly separated and tagged will not be accepted. Such waste must be repackaged by the user.

2. Radioactive wastes from the U.S. Army Medical Research Institutes of Infectious Diseases (USAMRIID), Ft. Detrick, will be transferred to the Radiation Protection Officer, Ft. Detrick (USNRC License Number 19-01151-02). USAMRIID will comply with the requirements of Ft. Detrick for transfer of waste to Ft. Detrick.

3. Principal Users will assure that packaged radioactive waste delivered to the above noted collection points is kept under constant surveillance until removed by Health Physics personnel to preclude the possibility of loss or theft.

4. Except for USAMRIID, all radioactive waste will be transported from the above noted collection points to the Radioactive Material Storage Areas located in Buildings 149-A, 509, and 516, Forest Glen Section, WRAMC, in accordance with the

procedures outlined in Health Physics SOP #1-4, AR 55-55 and Title 49 CFR.

5. Building 149-A, Forest Glen Section, WRAMC will be used for storage of radioactive liquid scintillation vial waste and radioactive biological waste. Buildings 509 and 516, Forest Glen Section, WRAMC will be used to store all other radioactive waste.

6. Storage areas are considered "Restricted Areas" and will remain locked to preclude the possibility of loss or theft and protect individuals from exposure to radiation or radioactive materials.

7. Radioactive Material Storage Areas will be posted by Health Physics personnel with the appropriate warning signs prescribed by Title 10, CFR, Part 20.203.

8. Wastes will be packaged for ultimate shipment and disposal in accordance with the instructions furnished by the waste disposal contractor. The waste disposal contractor is determined by US Army Armaments Command in accordance with AR 755-15.

HEALTH PHYSICS
WALTER REED ARMY MEDICAL CENTER
Washington, D.C. 20012

HSWP-QHP
MEMO #3
Annex D

12 July 1979

RADIOACTIVE WASTE DISPOSAL SUPPLIES

ANNEX D

1. Items of supply for the containment and packaging of radioactive waste are stocked by the Supply and Administration Branch, Materiel Division, Directorate of Industrial Operations, WRAMC. The stockage items meet US Army and Federal radioactive material packaging requirements for most of the radioactive waste resulting from laboratory and/or clinic procedures at WRAMC, WRAIR and AFIP. However, it should be noted that packaging requirements vary with the particular type, form and curie amount of the radioactive waste. Consequently all personnel involved with the packaging of radioactive waste should consult the Health Physics Office in order to assure that the available stockage items meet packaging specification requirements for each particular radioactive waste disposal operation.

2. Following are the currently stocked items:

(a) DRUM, Steel, DOT Specification 17-H, 30 gallon with gasket & sealing bolt. (Used as shipping container for the transport of radioactive liquids)

(b) DRUM, Steel, DOT Specification 17-H, 55 gallon with gasket and sealing bolt. (Used as a shipping container for the transport of low-level radioactive materials).

(c) VERMICULITE, 4 cu ft bags (Used as an absorbent material for the packaging of biological radioactive waste).

(d) SODIUM CHLORIDE, Rock (Used to retard spoilage of biological radioactive waste).

(e) BAG, Plastic, Yellow, 34" x 60", 4 mil thickness (Used as a liner for 55 gallon drum)

(f) BAG, Plastic, Magenta, 13" x 124", 2 mil thickness (Used as a liner for small laboratory radioactive waste receptacle).

(g) DIATOMACEOUS EARTH, Dicalite 4200, 2.5 cu ft bag (Used as an absorbent material for packaging of liquid radioactive waste)

3. Additional items will be stocked or procured as required to meet the provisions of Federal/State regulatory agencies.

4. Principal Users are responsible for funding the costs of materials and supplies used to dispose of radioactive wastes.

ITEM 19-THERAPEUTIC USE OF RADIOPHARMACEUTICALS

ITEM 20-THERAPEUTIC USE OF SEALED SOURCES

HEALTH PHYSICS
WALTER REED ARMY MEDICAL CENTER
Washington, D.C. 20012

HSWP-QHP
MEMO Number 7

18 July 1979

MANAGEMENT OF PATIENTS UNDERGOING BRACHYTHERAPY OR GROUP IV AND V RADIOPHARMACEUTICAL PROCEDURES AND PROTECTION OF PERSONNEL DURING BRACHYTHERAPY OR GROUP IV AND V THERAPY PROCEDURES

1. Purpose. The purpose of this SOP is to delineate the responsibilities of those individuals involved in brachytherapy or NRC Group IV and V procedures so as to minimize the ionizing radiation exposure to nursing and other patient care personnel, visitors, and to those who occupy or may occupy areas adjacent to the patient being treated.

2. Responsibilities.

a. Responsible Physician. The physician responsible for the brachytherapy or Group IV and V procedure should notify the Health Physics Office as far in advance of the planned procedure as possible but not less than two (2) full working days before the procedure. Information should include patient's name, ward, procedure, isotope, activity, and procedure duration. Records of the procedure and radioactive materials used will be maintained in accordance with standard clinical practice and the provisions of the Principal User's WRAMC authorization. Appropriate information will be placed in the patient's ward chart identifying the Responsible Physician. For brachytherapy cases forceps and a shielded radioactive source pig will be left in the patient's room during the procedure.

b. Health Physics Office.

(1) The Health Physics Office will coordinate aspects of the Health Physics support of the patient with the Responsible Physician.

(2) The Health Physics Office will brief nursing and other patient care personnel as to the radiation safety procedures involved with the particular patient. Aspects of the Health Physics support of the patient will be coordinated with the Primary Care Nurse.

(3) The Health Physics Office will discuss the procedure and Health Physics responsibility with the patient and, if possible, the patient's family so as to assure that the radiation safety requirements are understood.

(4) Health Physics personnel will be present during the application/insertion of brachytherapy sources and ingestion/application Group IV or V materials to insure that procedures are followed.

(5) The Health Physics Office will perform a radiation survey on the patient's room and environs and document the findings, both during and after the brachytherapy or other therapy procedure. Appropriate procedure SOP's, warning signs and labels will be posted. Bedside shields will be positioned to minimize exposure to personnel in adjacent areas to less than two (2) millirem in any one hour or 100 millirem in any seven (7) days.

Anti-contamination precautions will be effected when required. At least daily visits to this patient's room will be made during the procedure to insure safety precautions are being followed.

(6) Upon initiation of a brachytherapy or Group IV or V therapy procedure in Bldg 2, the Health Physics Office will survey the interstitial floors above and below the patient's room to determine if any areas exist where a person could receive a radiation dose in excess of two (2) millirem in any one (1) hour or 100 millirem in any seven (7) days. When such area(s) exist, the Health Physics Office will mark the perimeter of the area(s) with appropriate radiation warning signs, warning tape and flashing lights. The Health Physics Office will notify the Facilities Engineering Directorate that an area has been so marked. Upon completion of the brachytherapy or other therapy procedure, the Health Physics Office will remove the radiation warning signs, warning tape and flashing lights and notify the Facilities Engineering Directorate that the procedure has been completed and warning signs, tape and lights removed.

(7) After removal of the brachytherapy sources from the patient, the Health Physics Office will survey the patient's room to verify the removal of the sources and absence of contamination. The patient and, if possible, the patient's family will be debriefed. Nursing personnel and other patient care personnel will also be debriefed. The temporary shields will be removed.

(8) After determination has been made by the Health Physics Office that the activity in an iodine therapy patient (or other radionuclide therapy patient) has reached a level such that the integrated exposure will be less than 0.5 R at one (1) meter during the remaining complete decay, the Health Physics Office will coordinate with the Responsible Physician and the Primary Care Nurse for the debriefing and discharge of the patient and, if possible, the debriefing of the patient's family. Contamination control measures will be terminated and the room decontaminated as required. A final survey will be conducted to validate that decontamination has been effected. Any temporary shields will be removed.

(9) The Health Physics Office will provide Radiation Protection in-service classes and other instruction as required for personnel whose duties require their presence in or immediately adjacent to the patient's room.

c. Nursing Service.

(1) Nursing Service personnel should read the Health Physics instructions prior to performing nursing care on therapy patients.

(2) Pregnant nurses should not be assigned to care for these patients.

(3) Surgical dressings and bandages should be changed only by or under the direction of the attending physician. Dressings should not be disposed of until checked by the Health Physics Technician.

(4) Emergency Procedures:

The attending physician and Health Physics Technician must be notified in the event that

(a) The patient expires.

(b) Patient requires emergency surgery.

(c) An emergency occurs that requires the patient to be moved to another location.

(d) A brachytherapy source becomes loose or separated from the patient.

(e) Leakage occurs from puncture wounds associated with Group IV and V radiopharmaceutical therapies, e.g. colloidal Phosphorus-32.

3. Radioactive Waste Disposal.

Radioactive waste disposal will be in accordance with Health Physics Memo #3 and the provisions of this Memo and Annexes. Where feasible, urine from patients undergoing therapeutic doses of Iodine-131 will be collected in shielded containers for subsequent disposal by the Health Physics Office. Feces will not be saved unless required as part of the treatment plan. Disposal of feces, etc., by the patient's toilet will be accomplished by a minimum of three (3) complete flushes.

ROBERT M. QUILLIN
LTC, MSC
Health Physics Officer

ANNEXES
A - Health Physics Brachytherapy Instructions
B - Health Physics Instructions Concerning Patients Undergoing Colloidal Phosphorus-32 Therapy
C - Health Physics Iodine Therapy Instructions
D - Radioisotope Brachytherapy Monitoring Record
E - Radioisotope Therapy Monitoring Record Permanent Implant or Internal Dose.

HEALTH PHYSICS BRACHYTHERAPY INSTRUCTIONS

1. VISITORS. Visitors shall stay behind the line indicated by tape on the floor of the patient's room. No one under the age of 18 is allowed as a visitor. No pregnant women are allowed as visitors. Visits should be limited to 30 minutes except for those individuals who have been specifically instructed by the Health Physics Office (usually the spouse or other next of kin).

2. NURSING AND PATIENT CARE PERSONNEL. Nursing personnel caring for brachytherapy patients shall wear the personnel dosimeters furnished by the Health Physics Office while on duty. Other patient care personnel will not normally be assigned dosimeters unless the patient care requires their continued close proximity to the patient. Nursing and patient care personnel should spend as little time as possible near the patient for routine care procedures. Whenever possible the bedside shield should be used to shield personnel during such procedures. Bed baths should be minimized and kept as brief as possible. Again the bed shiled should be used if at all possible. Linen changes should be kept to a minimum and done as rapidly as possible. Dressings should be handled by or under the direction of the attending physician.

3. HOUSEKEEPING PERSONNEL. Only limited housekeeping procedures should be performed in the patient's room such as emptying the wastebasket, etc. Further housekeeping services should be performed only when determined to be necessary by the Nursing Supervisor. If more than minimal housekeeping procedures are to be performed, the housekeeping staff shall wear personnel dosimeters furnished by the Health Physics Office.

4. BRACHYTHERAPY SOURCES. Brachytherapy sources are sealed radioactive sources and no radioactive contamination should occur during the therapeutic procedure. No special precautions are needed for sputum, urine, vomitus, stool, dishes, utensils or bedding. The only potential problem which all personnel should be aware of is the loss of a brachytherapy source from the patient or the removal of a source by the patient. These sources vary in design but for the interstitial implants they are generally in the shape of large thick needles (several centimeters in length) or a series of individual small cells either imbedded together in a ribbon or separate. The separate cells or seeds look like short pieces of wire, usually gold in color. For intracavitary implants the sources are large cells (two centimeters long and three to four milimeters in diameter). While the loss of a brachytherapy source is rare, any unusual situation that arises or any unusual items found in the bed, near the patient, or in the patient's discarded dressings which match the above descriptions should be handled with forceps and reported at once to the Health Physics Technician and the Attending Radiation Therapy Physician in charge of the brachytherapy procedure.

5. HEALTH PHYSICS SUPPORT. Questions concerning any radiation protection measures related to this patient should be directed to the Health Physics Office, 427-5107. The Health Physics Technician monitoring this case is:

NAME: _____

HOME PHONE: _____

OFFICE PHONE: _____

HEALTH PHYSICS INSTRUCTIONS CONCERNING PATIENTS UNDERGOING COLLODIAL PHOSPHORUS-32 THERAPY

1. VISITORS. Visiting is in accordance with usual rules. There are no restrictions related to visitors except that visitors are not allowed to touch or handle patient's surgical dressings or clothing unless authorized to do so by the attending physician or nurse.

2. NURSING AND PATIENT CARE PERSONNEL. Nursing personnel caring for phosphorus-32 therapy cases will not normally be assigned personnel dosimeters due to the minimal external exposure involved. Bedside shields are not required. When handling surgical dressings, gloves should be worn. If there is any evidence of leakage from the puncture wound (e.g. stains, dampness, blood), the Attending Nuclear Medicine Physician and the Health Physics Technician must be notified immediately. All dressings showing evidence of leakage must be assumed to be radioactively contaminated. If such dressings must be removed by nursing personnel, they should be placed in plastic bags for disposal by the Attending Physician or the Health Physics Technician. If any question arises concerning contamination of patient linens or clothing, the Health Physics Technician should be notified so that an evaluation may be made. If there is no drainage from the wound after the first few days, dressings may be handled in the usual manner.

3. HOUSEKEEPING PERSONNEL. Routine housekeeping procedures apply.

4. COLLOIDAL PHOSPHORUS-32 THERAPY. Colloidal Phosphorus-32 therapy involves the injection of a colloidal phosphorus-32 solution into a body cavity. Phosphorus-32 is a pure beta emitter and does not give rise to significant external radiation. No special precautions regarding vomitus, urine, or sputum are necessary for patients treated with colloidal phosphorus. The only potential hazard as far as patient care is concerned relates to leakage from the puncture wound on to dressings, linens or clothing. Patients will, however, wear radioactivity precaution wrist bands. If a patient should need emergency surgery or should die, notify the Health Physics Technician and the Attending Nuclear Medicine Physician immediately.

5. HEALTH PHYSICS SUPPORT. Questions concerning any radiation protection measures related to this patient should be directed to the Health Physics Office, 427-5107. The Health Physics Technician monitoring this case is:

NAME: _____

HOME TELEPHONE NO. _____

OFFICE TEL. NO. _____

HEALTH PHYSICS IODINE THERAPY INSTRUCTIONS

1. VISITORS. Visitors shall stay behind the line indicated by tape on the floor of the patient's room. No one under the age of 18 is allowed as a visitor. No pregnant women are allowed as visitors. Visitors should be limited to 30 minutes except for those individuals who have been specifically instructed by the Health Physics Office (usually the spouse or other next of kin). Visitors shall not use the patient's bathroom. Smoking is not permitted either by the patient or by visitors.

2. NURSING AND PATIENT CARE PERSONNEL. Nursing personnel caring for iodine therapy patients shall wear the personnel dosimeters furnished by the Health Physics Office while on duty. Other patient care personnel will not normally be assigned dosimeters unless the patient care requires their continued close proximity to the patient. Nursing and patient care personnel should spend as little time as possible near the patient for routine care procedures. Whenever possible the bedside shield should be used to shield personnel during such procedures. Although the patient is usually ambulatory, the patient is confined to his/her room. Any departure, except for emergency reasons, requires the approval of the Health Physics Office. Excretions and vomitus from the patient are radioactive. If urine or vomitus is spilled, notify the Health Physics Office and use rubber gloves and booties during clean-up. Avoid spreading any contamination present. Containers lined with magenta bags will be available for deposit of disposable wastes. Linens will be placed in another magenta bag to be sorted and released by the Health Physics Office. Disposable eating utensils, dishes, and trays shall be used throughout the patient's hospitalization. Disposable gloves must be worn when attending the patient or handling items touched by the patient or containing material obtained from the body of the patient. No blood or urine samples should be obtained during the first 48 hours unless coordinated with the Health Physics Technician. Urinals or bed pans used by the patient should be flushed several times with hot soapy water after use.

3. HOUSEKEEPING PERSONNEL. Housekeeping personnel should not perform any tasks in the patient's room until the room has been released by the Health Physics Office. Magenta bags are not to be handled by housekeeping personnel.

4. RADIOIODINE THERAPY. Radioiodine therapy involves the oral administration of a solution containing I-131. What is not retained by the thyroid is excreted primarily in the urine and sputum. Consequently, special care must be taken when handling these excretions. Iodine-131 decays with an 8-day half life, therefore the radiation exposure rate will fall off fairly rapidly during the procedure. If the patient should need emergency surgery or should expire, notify the Health Physics Technician and the Attending Physician immediately.

5. HEALTH PHYSICS SUPPORT. Questions concerning any radiation protection measures related to this patient should be directed to the Health Physics Office, 427-5107. The Health Physics Technician monitoring this case is:

NAME: _____

OFFICE PHONE: _____

HOME PHONE: _____

RADIC) OPE BRACHYTHERAPY MONITORIN LCORD

NAME:	ADDRESS:	HOME PHONE:

ISOTOPE:	ACTIVITY:	TYPE OF IMPLANT:

PATIENT'S PHYSICIAN:	PHONE: DUTY: HOME:

ADMINISTRATION

LOCATION:	DATE:

PERSONNEL PRESENT:

DOSE DURING PROCEDURE: (IF AVAILABLE)

START TIME:	FINISH TIME:

NUMBER OF SOURCES/ACTIVITY TAKEN FROM STORAGE:

NUMBER OF SOURCES/ACTIVITY USED:

NUMBER OF SOURCES/ACTIVITY RETURNED TO STORAGE:

UNUSUAL EVENTS/REMARKS:

AREA SURVEY

WARD:	ROOM/BED:

PATIENT ROOM(S) SKETCH:

MEASUREMENTS

LOT.	MR/HR	DIST.	HEIGHT

SURVEY METER (MFG, MOD, SN)

AREA SURVEY *(Continued)*

EXPOSURE TO ADJACENT PERSONNEL

NAME	LOCATION	STATUS	EXPOSURE RATE	EST. TOTAL EXP.

WARD PERSONNEL DOSIMETRY ☐ SIGNS ☐ STAFF BRIEFING

SHIFT #1 ☐
SHIFT #2 ☐
SHIFT #3 ☐

SURVEYOR NAME (PRINT):

SURVEYOR NAME (SIGNATURE):

REMOVAL

LOCATION:

DATE:

PERSONNEL PRESENT:

EXPOSURE (IF AVAILABLE)

START TIME:

FINISH TIME:

NUMBER OF SOURCES/ACTIVITY REMOVED AND RETURNED TO STORAGE:

SURVEY:

PATIENT'S BED/AREA	mR/hr
ROOM	mR/hr
BATHROOM	mR/hr
LINEN ETC.	mR/hr

REMARKS:

SURVEYOR'S NAME (PRINT):

SURVEYOR'S NAME (SIGNATURE):

RADIOISOTOPE THERAPY MONITORING RECORD
Permanent Implant or Internal Dose

NAME:	ADDRESS:	HOME PHONE:

Isotope	Activity	Type of Implant

Patient's Physician:	Phone: Duty: Home:

A D M I N I S T R A T I O N

Location:	Date:

Personnel Present:

Dose During Procedure (if applicable)

START TIME:	FINISH TIME:

Unusual Events/Remarks:

AREA SURVEY

Ward	Room/Bed

Patient's Room(s) Sketch:

MEASUREMENTS

loc.	mR/hr	dist.	height

Survey Meter(mfg, mdl,sn)

EXPOSURE TO ADJACENT PERSONNEL

NAME	IDENTIFICATION	LOCATION	STATUS	EXP. RATE	EST. TOTAL EXP.

WARD PERSONNEL DOSIMETRY ☐ SIGNS ☐ STAFF BRIEFING ☐

Surveyor Name (Print) Surveyor Name (Sign)

THERAPY PROGRESS

DATE	TIME	DOSE RATE/1m	Activity

RELEASE DATA (Initial spaces)

Patients Residual Activity
Below "No Restriction" Level ____
(See Table 2 NCRP Report #37)
Patient given instructions:
Verbal ____ Written ____

*If patient's residual activity exceeds "No Restriction" level following must be completed.

Notify Health Physics Officer ___

Interview patient ____

"Radiation Safety Checklist ____

"Instructions for Family ____

Inform Patient's Doctor _____

Remarks:

Date Patient Released _____ Time _____

Survey of Room completed Date _____ Time _____

Room released to Ward _____

Surveyor Name (Print)	Surveyor Name (Sign)

ITEM 21

PROCEDURES AND PRECAUTIONS FOR USE OF RADIOACTIVE GASES

Information in this record was deleted
in accordance with the Freedom of Information
Act, exemptions 2
FOIA 2006-0238

Portions Ex2

nn/12/0

ITEM 21 - INFORMATION FOR THE USE OF XENON-133

a. Quantities to be Used:

(1) Patient information:

(a) Number of studies expected per week: 8

(b) Average activity per patient: 20 millicuries

(2) The desired possession limit is 500 mCi (See also Item 6b of this application).

b. Use and Storage Areas:

(1) Xenon-133 studies are only performed in room [redacted] Bldg 2, Walter Reed Army Medical Center (see attached drawing of the Xenon-133 dispensing room). Xenon-133 is stored in the Radiopharmacy, room [redacted] which is kept locked after duty hours. The individual leaded storage drawers used to house unused Xenon-133 vials are also kept locked. Each drawer is individually lead lined on the top, bottom and all four sides. (See attached drawing of the Nuclear Medicine Radiopharmacy).

Ex 2

(2) The attached drawings show the ventilation air flow rates and location of the exhaust vents and the supply vents of the Xenon-133 dispensing room and Radiopharmacy.

(3) The air flow rates for the Radiopharmacy and Xenon-133 dispensing room are such that the rooms are by design under negative pressure at all times.

ITEM 21 (Continued)

c. Procedures for Routine Use:

(1) The Procedures to be followed for routine use of Xenon-133 are as follows: When Xenon-133 is to be used for a patient's study, the necessary vial is removed from the storage unit and assayed in a dose calibrator. Once the assay has been completed, the Xenon-133 vial is placed in a lead container with top and transported to the imaging room. The patient is positioned and the Xenon-133 vial is loaded into a Xenon-133 gas dispensing system which provides more than adequate shielding prior to administration of the Xenon-133 gas. The gas is injected directly into a non-reusable bacterial filter with a 40 inch tube which is fitted to a mouth piece that is completely inserted into the patient's mouth. Nose clamps are applied to reduce loss of the Xenon-133 gas through the nasal passages. The opposite end of the tubing is attached to a XDS (Xenon Delivery System). The XDS (which is lead lined) merely regulates air flow for the various phases of the ventilation procedure along with trapping the CO_2 gas released by the patient. Hooked in tandem with the XDS unit is the "NONEX" Xenon gas trap which draws the exhaled air by a vacuum pump through the five fixed charcoal filter cartridges. The cartridge pack is shielded with a 1/8" lead barrier which makes external radiation levels negligible.

(2) Special apparatus for administration and collection of Xenon-133 are:

(a) Xenon-133 gas dispensing system by New England Nuclear, Model #: NRP 186 CALIDOSE.

ITEM 21 (Continued)

(b) XDS (Xenon Delivery System) by Nuclear Associates, Inc., Model 36-103.

(c) "NONEX" Xenon gas trap by Nuclear Associates, Inc., Model 36-022.

(3) Special procedures employed to reduce leakage: A patient nose clamp and a fitted mouth piece are used to reduce leakage.

d. Emergency Procedures:

When a Xenon-133 study is compromised, personnel are instructed to leave the room and to close the door. The negative pressure facilitates the removal of the Xenon-133 gas.

e. Air Concentrations of Xenon-133 in Restricted Areas:

(1) The maximum activity used per week (A): 1.6×10^5 uCI (see para (5)(a) below).

(2) Estimated fraction of Xenon-133 lost during use and storage (f): 20%

(3) Actual measured air flow: 908 ft^3/min

Calculated volume of air available per week for dilution of the Xenon-133: $V = 908\ ft^3/min \times \frac{year}{52\ week} \times 1.49 \times 10^{10} \frac{ml/year}{ft^3/min} = 2.6 \times 10^{11}$ ml/wk

(4) For restricted areas Section 20.103 of 10 CFR, Part 20 requires that:

$A/V \times f \leq 1 \times 10^{-5}$ uCi/ml

ITEM 21 (Continued)

(5) Calculation of required ventilation rate: A maximum of 20 mCi of Xenon-133 will be used per patient and a maximum of 8 studies per week will be performed. The ventilation rate required to ensure compliance with Section 20.103 of 10 CFR, Part 20:

(a) Maximum activity used per week:

$$A = \frac{20 \text{ mCi}}{\text{Patient}} \times \frac{8 \text{ Patients}}{\text{Week}} \times \frac{1 \times 10^3 \text{ uCi}}{\text{mCi}} = 1.6 \times 10^5 \text{ uCi/week}$$

(b) Assume a lost rate of 20% (f)

(c) $$V = \frac{A \times f}{1 \times 10^{-5} \text{ uCi/ml}} = \frac{1.6 \times 10^5 \text{ uCi/week} \times 0.2}{1 \times 10^{-5} \text{ uCi/ml}} = 3.2 \times 10^9 \text{ ml/week}$$

The required ventilation rate is:

$$\frac{3.2 \times 10^9 \text{ ml/week}}{40 \text{ hrs/week}} \div \frac{1.7 \times 10^6 \text{ ml/hr}}{\text{CFM}} = 47 \text{ CFM}$$

Since the ventilation rate in the Xenon dispensing room is 908 CFM, the ventilation system is satisfactory for a restricted area. The maximum permissible level of release of Xenon-133 per 40-hour week for a restricted area (NRC Regulatory Guide 10.8, Appendix M, Page 6) would be approximately 600 mCi. The amount of air that is recirculated is unknown but is thought to be minute since the recirculated air is recirculated to vents with flow rates of more than 80,000 CFM giving a dilution factor of almost 10^2.

f. Methods of Xenon-133 Disposal:

(1) Dilution through exhaust systems. Not used.

ITEM 21 (Continued)

(2) Absorption onto charcoal traps:

(a) An effluent concentration of less than 1 X 10^{-5} uCi/ml is released throughout the useful life of the filters as per the manufacturers literature.

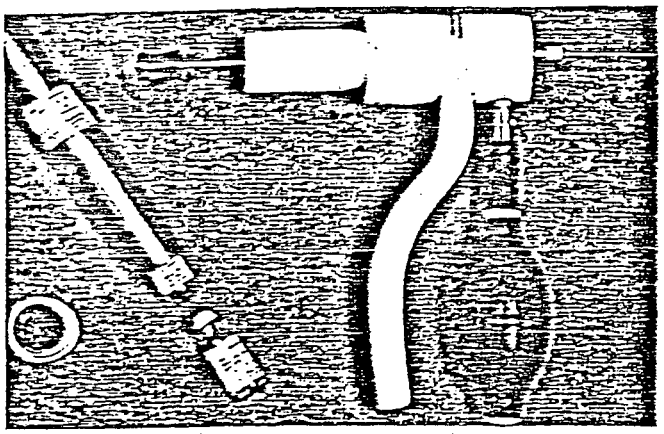
(b) A log is kept of the number of patients and the dose given to each patient. The filters are then changed using the Lifetime Graph (Fig 1, Instruction Manual "NONEX" Xenon Gastrap).

(c) The saturated filters are placed in a plastic bag and placed in a lead lined storage box in Nuclear Medicine Pharmacy. At the next waste collection date they are placed in a steel drum for radioactive waste disposal.

Xenon-133 Gas Dispenser

Xenon-133 gas

- Easy and accurate dispensing of unit doses
- Exceptional safety—unique shielding
- Sizes for single or multi-breath procedures
- Specifically designed for pulmonary function studies



Specifically designed for pulmonary function studies, NEN's Xenon-133 CALIDOSE™ Gas Dispensing System provides a convenient, accurate and safe method of administering xenon-133 gas.

The system consists of a dispenser which is loaded with a vial containing a calibrated dose of xenon-133 gas.

Vials containing 10-100mCi of xenon-133 gas are shipped in a lead tube and loaded into the dispenser as needed. The variety of sizes available permits either single or multi-breath procedures.

OPERATION

Operation of the unit is simple. After the dispenser is loaded, affix the dispenser to the breathing apparatus with a needle or other connector; push the plunger at the rear of the dispenser (puncturing the septum of the loaded vial by inner needles); and squeeze the rubber bulb.

Caution: Contents to be used *only* for inhalation.

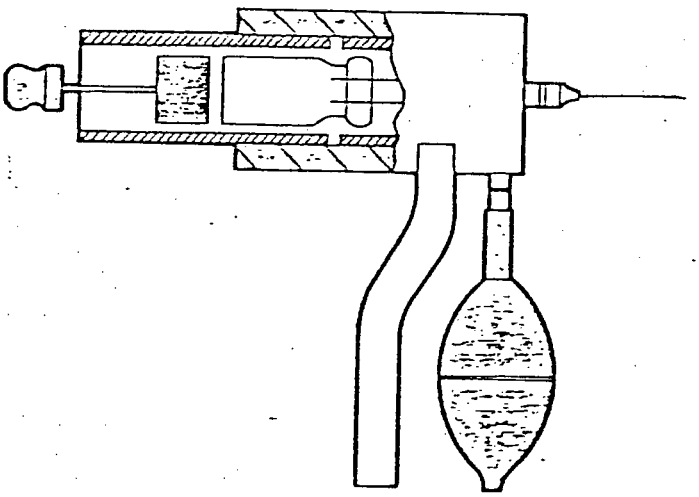
ORDERING INFORMATION

NRP-186 CALIDOSE Gas Dispenser
Supplied at no charge during the term of an order.

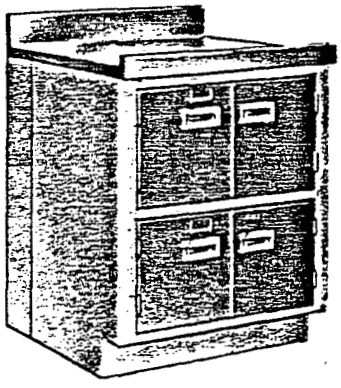
NRP-127 Xenon-133 Gas CALIDOSE refills, in unit dose vials.

5 unit doses	(10mCi each)—	$ 95
10 unit doses	(10mCi each)—	135
1 unit dose	(100mCi each)—	85
5 unit doses	(100mCi each)—	245

Intermediate quantities, quantities larger than listed, and standing order prices are available on request.

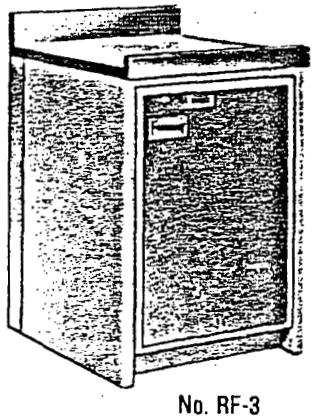


STANDARD SYSTEM MODULES



No. RH-3

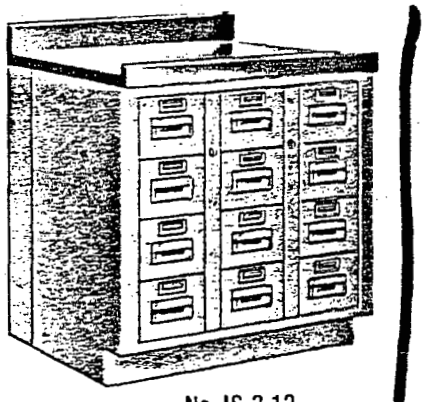
No. RH-3 Receiving, Holding and Storage Module provides a lead shielded upper compartment for receiving and holding materials received into the Nuclear Medicine Department until time permits re-location and storage in the proper module. The lower lead shielded compartment may be used for short or long term decay.



No. RF-3

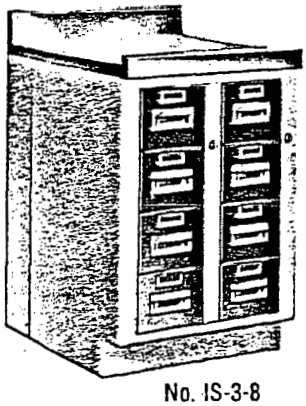
No. RF-3 Refrigerator Module provides a 4 cu. ft. lead shielded refrigerator complete with a freezer compartment and two lead shielded drawers. The U.L. listed refrigerator operates on single phase, 60 cycle, 115 volt AC, and is equipped with wide range temperature control and push button defrost.

STORAGE FOR XENON-133



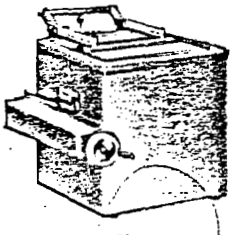
No. IS-3-12

No. IS-3-12 Inventory and Storage Module provides for the inventory of generator prepared reagents and other radiopharmaceuticals. Utilization of this module will facilitate record keeping. The twelve drawers operate on heavy duty roller slides, and are individually lead shielded on the top, bottom and all four sides. All drawers are provided with coved interior plastic inserts for ease of cleaning and/or decontamination.



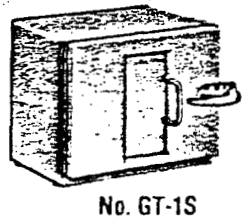
No. IS-3-8

No. IS-3-8 Inventory and Storage Module is similar to No. IS-3-12, except provides only eight drawers.



No. GT-1

No. GT-1 Generator Safe (for top elution generators) is lead shielded on all four sides, top and bottom, and provides radiation protection from the generator during and between elutions. A front remote control is provided to raise the cover partially for elution, or full open for generator replacement. The underside of the cover is equipped with a mirror to allow an indirect view of the generator for positioning elution vials without exposing the technologist to the open safe. Wheels are provided on the bottom of the safe to enable the user to move it to the front of the work surface for elution, and to the rear when it is not being used.



No. GT-1S

No. GT-1S Generator Safe (for front elution generators) is lead shielded on all four sides, top and bottom, and provides radiation protection from the generator during and between elutions. It includes a full swinging front door for generator replacement and a sliding door for the elution process. Wheels are provided on the bottom of the safe to enable the user to move it to the front of the work surface for elution, and to the rear when it is not being used.

ITEM 22

PROCEDURES AND PRECAUTIONS FOR USE OF RADIOACTIVE MATERIAL IN ANIMALS

HEALTH PHYSICS
WALTER REED ARMY MEDICAL CENTER
Washington, D.C. 20012

HSWP-QHP
MEMO #8

12 July 1979

PROCEDURES AND PRECAUTIONS FOR USE OF RADIOACTIVE MATERIALS IN ANIMALS

1. The following animals are used in radioisotope studies at Walter Reed Army Medical Center and supported activities: rats, mice, rabbits, hamsters, guinea pigs, dogs and sub-human primates.

2. Description of Animal Housting Facilities

a. Laboratory animals will be housed in the following locations or as specified in the appropriate radioactive materials authorization:

(1) Fourth floor of WRAIR (Bldg 40)

(2) First and second floors of the Randall Building (Bldg 500)

(3) Fifth floor of AFIP (Bldg 54)

(4) Laboratory suites on floors 1 and 2 of USAMRIID, Bldgs 1412 and 1425 at Ft. Detrick, MD.

b. Animal housing facilities shall be under the supervision of a military veterinarian. Animal rooms shall be used solely for the purpose of housing laboratory animals. Rooms shall be well ventilated and adequately lit.

c. Animal rooms housing animals containing radioactive materials shall be labeled with the appropriate warning signs. These rooms shall be approved for radioactive material use by the Radiation Control Committee.

The Health Physics Office shall monitor these areas for radioactive contamination.

3. Instructions to Animal Caretakers for the Handling of Animals, Animal Wastes, and Carcasses and the Cleaning and Decontaminating of Animal Cages

The "Instructions for Care and Disposal of Animals Containing Radioactive Materials" is attached as Annex A. Double bagging will be used.

4. Security Procedures

a. Animal housing facilities are restricted areas, off limits to all but authorized personnel.

b. During duty hours animal housing facilities shall be attended by authorized users of radioactive materials in animals, animal caretakers, and veterinary staff.

c. After duty hours buildings containing animal housing facilities shall be secured. Personnel shall be on duty through the night and weekends to maintain building security. Only persons duly authorized shall be permitted in the animal housing facilities.

ROBERT M. QUILLIN
LTC, MSC
Chief, Health Physics

ANNEXES
A - Instructions for Care and Disposal of Animals Containing Radioactive Materials
B - Armed Forces Institute of Pathology SOP for Use of Radioisotopes in Laboratory Animals
C - Walter Reed Army Institute of Research Regulation for Care and Housing of Laboratory Animals
D - Procedure for Removal of Radioactive Carcasses from USAMRIID Biological Containment
E - USAMRIID Animal Quality Assurance Program

HSWP-QHP
MEMO #8 (Annex A)

12 July 1979

ANNEX A

INSTRUCTIONS FOR CARE AND DISPOSAL
OF
ANIMALS CONTAINING RADIOACTIVE MATERIALS

1. All waste materials, to include carcasses and excreta, from cages labeled with a "Caution -- Radioactive Material" placard will be disposed of as radioactive waste. All waste materials will be monitored using appropriate survey meters before removal from the animal care facility. DO NOT dispose of carcasses until instructed to do so by the principal investigator concerned.

2. The following procedures will be used when disposing of animal wastes from cages marked with "Caution: Radioactive Materials" placards:

a. Wear disposable gloves and protective coveralls

b. Wear disposable, waterproof shoe covers

c. Use only tools designated for this purpose. Keep these tools segregated in protective containers. Do not use the tools for purposes other than cleaning radioactively contaminated cages and handle them only when wearing protective clothing.

d. Place all animal droppings, bedding and carcasses in heavy magenta bags. "Double bagging" will be used with each bag sealed separately. Place a tag on the bag and copy information from the cage tag on the bag tag. Also write on the tag "Animal Carcasses". Deliver the bag to the designated radioactive waste collection area for disposal.

nn/12/9

3. All cages which have been used to house animals containing radioactive materials will be hosed thoroughly (approximately five minutes) in the wash rack area before reuse. Hose cages until no foreign material adheres to the cage. Wear protective clothing as specified in para. 2 above when performing this operation. Dispose of disposable protective clothing as radioactive waste. Have overalls checked for contamination before reuse. The investigator is responsible to monitor cages prior to placing them back into general use.

4. When radioactive wastes such as urine or feces are spilled, a separate mop and bucket should be used for cleaning. Mop the floor with soap and water and rinse twice. Use the tools for this purpose ONLY. Dispose of old mop heads as radioactive waste.

5. Contact your supervisor, your organization radiation protection officer of the WRAMC Health Physics Officer (301/427-5107) concerning any case not covered by instructions.

HSWP-QHP
MEMO #8

29 June 1979

ANNEX B

STANDARD OPERATING PROCEDURE

DIVISION OF LABORATORY ANIMAL MEDICINE, AFIP

USE OF RADIOISOTOPES IN LABORATORY ANIMALS

1. All research protocols within the AFIP will be approved by the Research Committee according to procedures in AFIP Regulation 70-1. Protocols involving the use of animal models will be reviewed by the Laboratory Animal Use Review Committee. Those research studies involving the use of radioisotopes will, in addition to review of the two AFIP committees, be reviewed by the WRAMC Radioisotope Committee for propriety of radioisotope use. A file of current approved protocols will be maintained by the AFIP research office. All procurement of radioisotopes by Investigators using animals will be made through the WRAMC Health Physics office and deliveries will be made to the Health Physics Office.

a. The areas of radioisotope use (including laboratories, animal rooms, necropsy rooms) will be approved and monitored by the WRAMC Health Physics Office.

b. All users of radioisotopes in laboratory animals will comply with the WRAMC Health Physics office procedures and regulations concerning laboratory equipment, trash disposal, storage, personnel monitoring, film badges, and labeling of all radioactive/radioisotope areas and equipment.

c. User certification can be suspended or withdrawn by the Health Physics Office at any time if improper radioisotope use is detected.

2. Animals for use in studies with radioisotopes will be purchased and quarantined according to established procedures in the Division of Laboratory Animal Medicine, AFIP. Radioisotopes will be used only in animals when the research protocol specifically states the conditions of the use to include, the isotope name, the route of administration, the duration of the study, the descriptions of the research manipulations involving these animals, and the disposition of any dead animals or tissues from animals containing radioisotopes.

a. Animals for use in these studies will be housed in rooms approved by the WRAMC Health Physics Office. These rooms will be labeled by proper Radiation Hazard signs and monitored by the WRAMC Health Physics Office.

b. Animals will be housed either in solid bottom and solid sided cages, or in cages with fecal drop pans. The bedding and fecal material from these animals will be collected and placed in magenta colored bags. The animal caretaker/technician who performs this husbandry will wear a mask, gloves, surgical scrub suit, and his/her film badge. The magenta bags will be delivered to the WRAMC Health Physics pick up point for the disposal of radioactive waste. The bags will be labeled with the office/room of origin, the isotope used, and date.

c. Dead animals or tissues that are not saved by the investigator will be placed in magenta colored bags. Technicians performing these duties, including necropsy assistants, will be wearing a mask, gloves, surgical scrub suits and their film badge. These bags will be labeled with the office/room of origin, isotope used, date, and animal species. The label will contain the statement "dead animals for disposal". These bags will be taken to the radioactive waste disposal point.

3. In the event of any spills of radioactive substances, escapes of animals on radioisotope studies, or other unusual circumstances the Division NCOIC will be notified immediately; appropriate notification and requests for information or assistance will be made to the WRAMC Health Physics Office.

HSWP-QHP
MEMO #8 (Annex C)

29 June 1979

ANNEX C

WRAIR REG # 70-19

CARE AND HOUSING OF LABORATORY ANIMALS

24 May 1978

Posted 30 May 78.

DEPARTMENT OF THE ARMY *WRAIR REG 70-19
HEADQUARTERS, WALTER REED ARMY INSTITUTE OF RESEARCH
WALTER REED ARMY MEDICAL CENTER
Washington, DC 20012

WRAIR REGULATION
NUMBER 70-19

24 May 1978

RESEARCH AND DEVELOPMENT

Care and Housing of Laboratory Animals

	Paragraph
PURPOSE	1
APPLICABILITY	2
DEFINITION	3
RESPONSIBILITIES	4
HUSBANDRY PROCEDURES	5
ANIMAL RECORDS AND IDENTIFICATION	6
PREVENTIVE MEDICINE	7
CARE OF EXPERIMENTAL ANIMALS	8
EUTHANASIA OF EXPERIMENTAL ANIMALS	9
DISPOSAL OF DEAD ANIMALS AND ANIMAL WASTE	10
PERSONNEL	11
REFERENCES	12

1. PURPOSE. The purpose of this regulation is to establish policy, responsibility and procedures concerning the care, housing and disposition of laboratory animals utilized within the Walter Reed Army Institute of Research.

2. APPLICABILITY. Guidelines prescribed herein apply to all personnel utilizing laboratory animals, regardless of species, used in support of biomedical research, testing, experimentation, exhibition, or teaching purposes.

3. DEFINITION. Laboratory animals, for the purpose of this regulation, are defined as all vertebrate animals used in support of clinical investigation and biomedical programs, as well as in diagnostic laboratory procedures.

4. RESPONSIBILITIES.

a. Division Directors and Chiefs of Special Activities are responsible for:

*This regulation supersedes WRAIR Regulation 70-3 dated 20 June 1975.

ANNEX C

(1) Implementation of the provisions of this regulation.

(2) Review and approval of animal requisitions.

(3) Assurance that adequate caging and space for holding animals is available prior to the intended date of issue.

(4) Care and management of research animals when animal caretaker personnel are intrinsic to the respective division or activity.

(5) Establishment of a division level animal use committee for review of protocols utilizing animals as outlined in WRAIR Reg 70-18.

b. The Chief, Department of Animal Resources is responsible for:

(1) Periodic inspection of all experimental animal holding areas to determine compliance with the provisions of this regulation.

(2) Assuring maintenance of appropriate quarantine measures, and prophylactic testing procedures. (TB, etc.)

(3) Care and management (husbandry) of all research animals when requested.

(4) Clinical medical support/consultation of research animals when requested.

(5) Consultation services on various aspects of laboratory animal medicine including design and use of animal models in research.

(6) Storage, handling and transportation of animal carcasses for final disposition.

c. Responsible investigators will assure:

(1) Animals are used and maintained in compliance with current animal welfare regulations.

(2) Care and feeding of laboratory animals requiring special handling or animals involved in special studies with infectious, radioactive, or other health hazard materials.

(3) Proper disposition of animals upon death or termination of a study to include the following:

(a) Return or recycling of animals where appropriate.

(b) Euthanasia in accordance with current animal welfare regulations.

(c) Requests for necropsy.

(d) Appropriate annotation of WRAMC Form 348 (Individual Animal Record).

(e) Decontamination of carcasses where potential pathogens or hazardous materials are involved.

(f) Appropriate packaging and refrigeration of carcasses to minimize exposure to personnel responsible for further processing.

(4) Proper medical treatment of all animals requiring same, to include referral to or requesting services of the attending veterinarian when appropriate.

5. HUSBANDRY PROCEDURES.

a. Feeding and watering.

(1) All laboratory animals shall be fed daily on a regular schedule according to their particular requirements except as dictated by experimental design or veterinary therapy.

(2) All laboratory animals shall have maximum access daily to potable water except as dictated by experimental design or veterinary therapy.

b. Caging and housing.

(1) Rooms in which animals are housed shall be adequately lighted and ventilated and the temperature shall be maintained within acceptable limits for respective species.

(2) Animal rooms shall not be overcrowded with animal cages beyond the capabilities of the air conditioning or ventilation system.

(3) The number of cages per room shall be limited to permit effective sanitary maintenance and servicing.

(4) Animal rooms will not be used as laboratories or offices. Equipment and supplies shall not be stored in animal rooms.

(5) Maximum holding capacity of cages commonly in use at the WRAIR is set forth in Annex A.

(6) Holding/restraining chairs for nonhuman primates will be used only when the nature of the experiment requires such use. Restrained animals will be examined frequently throughout the experiment to ensure early detection of any problem arising from the restraints.

(7) Dogs will not be maintained in the Building 40 complex or in Building 500, Forest Glen, in excess of 21 days without prior approval of the Director, WRAIR. Requests for such approval should be directed through Director, Division of Veterinary Medicine. Dogs designated for observation beyond the 21 day period will be returned to the Canine Holding Area, Building 511, Forest Glen, but will continue to be charged to the responsible investigator.

(8) Animals requiring routine veterinary treatment will not normally be returned to Building 511 until recovery is complete.

6. ANIMAL RECORDS AND IDENTIFICATION.

a. Each dog, cat, rabbit, nonhuman primate, and farm animal will be assigned an individual identification number by the Department of Animal Resources. The number will be affixed to the animal by tatoo, metal tag, or other acceptable method for permanent identification. Individual investigators will be responsible

for maintaining accurate identification of animals under their control.

b. Individual animal record cards will be initiated by the Department of Animal Resources during quarantine/conditioning.

(1) WRAMC Form 348 (Individual Animal Record) will be used for each dog, cat, nonhuman primate and farm animal.

(2) Individual Animal Records (WRAMC Form 348) will accompany animals upon issue and will be completed by the individual investigator and maintained by the attending veterinarian. Farm animal records normally will be maintained at the Fort Meade Facility.

(3) All animals returned to Forest Glen for long term hold or recycling will be accompanied by carefully detailed animal record cards. Accurate records are critical to the maximum reuse of animals in research.

(4) Animal records will be appropriately annotated upon animal expiration (regardless of cause) and returned to the Department of Animal Resources, Building 511, where the records will be retained on file for a period of at least one year.

c. All occupied animal cages will be marked with the investigator's name, telephone number, protocol number, FIC number, and (when available) the individual animal identification number.

7. PREVENTIVE MEDICINE.

a. The Chief, Department of Animal Resources and staff will:

(1) Review all animal preventive medicine and disease control programs.

(2) Establish and monitor quarantine procedures for dogs, cats, nonhuman primates, rabbits, and farm animals.

(3) Establish and maintain a quality control program for the WRAIR rodent production colonies to include:

(a) Bacterial screening

(b) Histopathology

(c) Parasite surveillance

(d) Serological profiles to monitor viruses

b. TB control will be in accordance with WRAIR Reg 385-2.

c. Animal bite incidents will be processed in accordance with WRAIR Supplement 40-655.

d. Because of the risk of exposing and/or contaminating research animals with microorganisms adversely affecting research results, no exogenous or feral animals will be permitted within the WRAIR facilities without processing or approval by the Department of Animal Resources.

8. CARE OF EXPERIMENTAL ANIMALS.

a. Research projects involving live animals must have an approved protocol and must be performed by, or under the direct supervision of a qualified scientist.

b. The use of anesthetic, analgesic, or tranquilizing drugs shall effectively minimize the pain and discomfort of the animals while under experimentation and will be used where any animal would experience pain above that inflicted by normal injections, handling, and sampling procedures. The Department of Animal Resources will provide guidelines and consultation concerning appropriate use of these drugs.

c. Experimental protocols and/or procedures involving induced pain where the use of anesthetics, analgesics, or tranquilizers would defeat the purpose of the experiments must be approved by the Division Director and/or the Laboratory Animal Investigation Review Board, and must be directly supervised by the responsible investigator.

d. Surgical projects requiring animal survival beyond the day of surgery will be performed in accordance with acceptable hospital/surgical practice to minimize post surgical infections and pain.

e. Dogs returned from surgery will be retained in the intensive care ward under proper attention until they are fully recovered from anesthesia.

f. Preoperative and postoperative care of animals are the responsibilities of the principal investigator, who will request professional veterinary care when and if appropriate. Every effort will be made to minimize discomfort to the animal during convalescence in accordance with acceptable hospital practice.

9. EUTHANASIA OF EXPERIMENTAL ANIMALS. Euthanasia of animals will be performed in a humane manner by methods which produce instantaneous unconsciousness and immediate death without visible evidence of pain or distress. Responsible investigators will follow guidelines of the Department of Animal Resources for euthanasia of animals.

10. DISPOSAL OF DEAD ANIMALS AND ANIMAL WASTE.

a. Animal Carcasses

(1) Each investigator is responsible for the proper disposition of dead animals.

(2) When dead animals are discovered by caretakers, floor supervisor will notify the responsible investigator and or his designated agent will provide for expeditious removal of the dead animal.

(3) All dead animals will be placed in non-permeable containers and clearly tagged for appropriate disposition. Information to be indicated on the tag is as follows:

(a) Name of originator

(b) Phone extension where individual may be reached

(c) If plastic bags are used, carcasses will be bagged and each bag will be individually sealed.

d. Surgical projects requiring animal survival beyond the day of surgery will be performed in accordance with acceptable hospital/surgical practice to minimize post surgical infections and pain.

e. Dogs returned from surgery will be retained in the intensive care ward under proper attention until they are fully recovered from anesthesia.

f. Preoperative and postoperative care of animals are the responsibilities of the principal investigator, who will request professional veterinary care when and if appropriate. Every effort will be made to minimize discomfort to the animal during convalescence in accordance with acceptable hospital practice.

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(3) All dead animals will be placed in non-permeable containers and clearly tagged for appropriate disposition. Information to be indicated on the tag is as follows:

(a) Name of originator

(b) Phone extension where individual may be reached

(c) If plastic bags are used, carcasses will be double bagged and each bag will be individually sealed.

(d) When more than one carcass is placed in a container, the maximum weight will not exceed fifty (50) lbs.

(4) Animals destined for necropsy will be appropriately identified and refrigerated in accordance with requirements of the Division of Pathology. The following information will be provided:

(a) Name of investigator and telephone number

(b) Name of Department

(c) Species of animal and identification number

(d) History of experimental procedure

(e) Tentative diagnosis or other instructive information to the Division of Pathology.

(5) Animal carcasses destined for routine disposal will be placed in appropriate freezers located adjacent to Room 4092.

(6) Carcasses of animals involved in communicable disease studies and deemed by the responsible investigator to be potentially hazardous to handle will be decontaminated by autoclaving before leaving the facilities.

(7) Animal carcasses involved in radioisotope studies will be decontaminated and disposed of in accordance with WRAMC Reg 40-10.

(8) Animal carcasses originating from the Forest Glen Section will be processed as above except as follows:

(a) Routine necropsies will be conducted at Bldg 40.

(b) All animal carcasses involved in communicable disease studies requiring autopsy and animals dying during the quarantine period will be necropsied at the Bldg 511 facility.

(c) Animal carcasses for routine disposal will be placed in the Department of Animal Resources freezers, Bldg 511.

b. Disposal of Waste.

(1) All animal waste (except that contaminated with infectious or radioactive material) shall be collected in G.I. cans with plastic liners. The plastic bags will be sealed and placed into the commercial compactor/containers in the area in accordance with WRAMC Regulation 420-5.

(2) Noncombustible materials such as glass, metal, etc, shall be placed in separate cans. In no instance shall such material be placed in cans with animal waste.

(3) Each investigator is responsible for assuring that equipment associated with the experimental procedures is properly cleaned and/or disposed of.

(4) Animal waste, bedding, litter, and experimental equipment contaminated with infectious material shall be processed through an autoclave before being delivered for disposal. Infectious waste will be handled in accordance with WRAMC Regulation 40-2.

11. PERSONNEL.

a. The maintenance of high standards of personal cleanliness among animal caretakers and personnel associated with animal colonies is mandatory.

b. Personnel involved with the care or use of nonhuman primates shall be considered as having increased potential risk of exposure to hazardous organisms in accordance with WRAIR Supplements 40-26 and 40-562. Personnel shall wear face masks and appropriate protective clothing (coveralls, gloves, etc.) while working in or visiting primate holding areas.

c. Personnel involved with the care or use of animals utilized in infectious disease research shall receive appropriate immunizations in accordance with WRAIR Supplement 40-562.

d. All animal areas of WRAIR are designated "Restricted Areas" and are OFF LIMITS to unauthorized personnel.

12. REFERENCES.

a. AR 70-18

b. PL 89-544

c. PL 91-579

d. WRAMC Reg 40-10

e. WRAMC Reg 420-5

f. WRAIR Suppl 40-26

g. WRAMC Reg 40-2

h. WRAIR Suppl 40-562

i. WRAIR Suppl 40-655

j. WRAIR Safety SOP's

k. DHEW Pub #(NIH) 72-23

SGRD-UWN

FOR THE DIRECTOR:

James L Carpenter

JAMES L. CARPENTER
CPT, MSC
Adjutant

DISTRIBUTION:

A & B

ANEX A.

MINIMUM HOLDING CAPACITY CAGES COMMONLY USED AT THE WRAIR

AGES	Mice 20-40 gms	Mice Litters	Rats 150-250 gms	Guinea Pigs to 350 gms	Guinea Pigs over 350 gms	Hamsters over 10 wks old	Rabbits 3-5 lbs	Rabbits 6-8 lbs	Rabbits over 8 lbs	Dogs 20" long-Nose to tailbone	Dogs 30" long	Dogs 36" long	
ab Jars 8" diam.	5	1											
ouse Litter Cans 6"x8"	5	1											
reeding Cages 10"x20"	20		6			13							
et Cages 24"x24"			18										
ing Cages													
nkey Cages 18"x24"													
nkey Cages 24"x30"													
g Cages 26"x28"										1			
g Cages 30"x42"											1		
g Cages 36"x48"												1	
inea Pig Cages 24"x36"				9	14								
abbit Cages 10"x24"							2	1					
abbit Cages 34"x24"							3	2	1				
mall Hanging Cages 8"x10"	8	2				5							
arge Hanging Cages 9.5"x17"	16	5		2	1	10							
arge Plastic Cages 9.5x17"	16	5				10							
mall Plastic Cages 6.5"x11"	7	2				4							
neral Purpose Cages 12"x20"				2	4								

ARIOUS HOLDING CAPACITY CAGES
COMMONLY USED AT THE [illegible]

	Rhesus Monkeys 10 lbs	Rhesus Monkeys 10 lbs	Baboons Juvenil	Baboons Adult	Chimps	Chickens Adult							
ES													
Jars 8" diam.													
se Litter Cans 6"x8"													
eding Cages 10"x20"													
Cages 24"x24"													
mp Cages			2	1	1								
xi Cages 18"x24"	1					1							
key Cages 24"x30"		1				1							
Cages 26"x28"													
Cages 30"x42"													
Cages 36"x48"													
inea Pig Cages 24"x36"													
bbit Cages 10"x24"													
bbit Cages 34"x24"													
all Hanging Cages 8"x10"													
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neral Purpose Cages 12"x20".													

HSWP-QHP
MEMO #8 (Annex D)

12 July 1979

ANNEX D

USAMRIID SOP IRCC #6

PROCEDURE FOR REMOVAL OF RADIOACTIVE CARCASSES FROM USAMRIID

1 June 1979

DEPARTMENT OF THE ARMY
HEADQUARTERS, U.S. ARMY MEDICAL RESEARCH INSTITUTE OF INFECTIOUS DISEASES
FORT DETRICK, FREDERICK, MARYLAND 21701

STANDING OPERATING PROCEDURE 1 June 1979
IRCC #6

PROCEDURE FOR REMOVAL OF RADIOACTIVE CARCASSES FROM USAMRIID

BIOLOGICAL CONTAINMENT

1. Carcasses (an individual monkey or groups of small animals, both infected and non-infected controls) are placed in 20" x 30" Chieftan nylon bags (an American Hospital Supply product). The bag is sealed tightly, rolling the open end and applying autoclave tape. Only this specific type of nylon bag should be used; other types are destroyed by autoclave heat. The bag should be marked with "Radioactive and bio-hazard waste" and identified as outlined in IRCC SOP #4. The properly labeled bag is placed in freezer in Room 704-F.

2. The Health Physics NCOIC will notify the co-worker listed on the bag at least 24 hours before the radioactive waste is to be shipped from the institute. The co-worker will be responsible for autoclaving the carcasses.

3. Three autoclaves are currently authorized for the sterilizing of radioactive material (Virology Suite 1, Bacteriology Suite 2 and Animal Assessment Suite 2). The co-worker must contact the principal investigator in one of the authorized suites to arrange for "back-end" operation of the autoclave.

4. Multiple bags of frozen carcasses (from more than one co-worker) will be placed in a 55-gallon barrel until it is 2/3 full. Wood shavings must be added periodically to absorb moisture during autoclaving. The barrel must be labeled as containing radioactive waste. The name of each co-worker, date and amount and type of isotope must be recorded on the card on the left of each barrel.

5. The barrel minus lid is placed in the exit-autoclave of one of the authorized suites and the personnel in the suite will operate the autoclave on "dry" cycle with a one hour sterilizing time.

6. The Health Physics NCOIC should be notified as to the time that the radioactive carcasses are to be picked up from the autoclave.

7. At the time of pickup, the Health Physics technician will seal and properly relabel the container as radioactive and check to insure that the complete description of radioactive material within the container is listed on its lid.

Appx D

8. Radioactive carcass waste will be packed for shipping in accordance with HSWP-QHP dated 8 May 79.
DF

WILLIAM R. BEISEL, M.D.
Scientific Advisor
HQ, USAMRIID

HSWP-QHP
MEMO #8 (Annex E)

12 July 1979

ANNEX E

USAMRIID SOP

ANIMAL QUALITY ASSURANCE PROGRAM

Unnumbered and Undated

ANIMAL RESOURCES DIVISION
U.S. ARMY MEDICAL RESEARCH INSTITUTE OF INFECTIOUS DISEASES
FORT DETRICK, FREDERICK, MARYLAND 21701

STANDING OPERATING PROCEDURE

ANIMAL QUALITY ASSURANCE PROGRAM

	Paragraph
PURPOSE.	1
SCOPE.	2
QUALITY OF ANIMALS	3
PROCEDURES	4
QUALITY OF WATER SUPPLY.	5
QUALITY OF SANITATION OF WATER BOTTLES AND SIPPER TUBES.	6
APPENDIX A - PROCEDURE FOR COLLECTING, HANDLING, INOCULATING, INCUBATING, AND IDENTIFYING BACTERIAL SPECIMENS.	
APPENDIX B - SODIUM NITRATE FECAL FLOTATION PROCEDURE.	
APPENDIX C - PROCEDURES FOR IDENTIFICATION OF ECTOPARASITES.	
APPENDIX D - PROCEDURE FOR ISOLATION OF PASTEURELLA AND BORDETELLA FROM NASAL SWABS OF RABBITS.	
APPENDIX E - PROCESSING OF NEWLY ARRIVED NONHUMAN PRIMATES.	
APPENDIX F - PROCEDURE FOR THE MONTHLY MONITORING OF THE USAMRIID WATER SUPPLY AND THE EFFICACY OF THE SANITIZING OF WATER BOTTLES AND SIPPER TUBES.	
APPENDIX G - ROUTINE TREATMENT OF NONHUMAN PRIMATES.	

1. PURPOSE.

This program is directed to evaluate the health condition of incoming research animals to improve the validity, integrity and reproducibility of animal-related research at U.S. Army Medical Research Institute of Infectious Diseases.

2. SCOPE.

All research animals obtained from outside sources will be included in the program. This will routinely include mice, rats, hamsters, guinea pigs, rabbits and nonhuman primates. Other less commonly used species, such as birds, reptiles, amphibians, etc., will be included should they be introduced to the USAMRIID facilities. All incoming animals must be free of signs and symptoms of infectious diseases, should be homogenious in genetic

ANNEX E

background, and free of physical abnormalities. Initial and subsequent periodic examinations will be performed to ascertain the current health status of each group of animals. This will inlcude monitoring for previous exposure to and latent infection with a variety of biological agents.

3. QUALITY OF ANIMALS

a. Mice

(1) Mice must be free from evidence of the following:

(a) Lymphocytic Choriomeningitis (LCM)

(b) Ectrometia virus

(c) Toxoplasma sp

(2) Mice should be monitored for presence of the following:

(a) Murine viruses

1 ectromelia

2 GD VII

3 K-virus

4 LCM

5 MHV

6 Mouse adenovirus

7 MVM

8 Polyoma

9 PVM

10 Reo-3

11 Sendai

(b) Bacteria

1 *Salmonella sp*

2 *Corynebacterium sp*

3 *Pseudomonas sp*

(c) *Mycoplasma sp*

(d) Internal and external parasites

(e) Protozoa

Toxoplasma sp

b. *Rats*

(1) Rats must be free from evidence of the following:

(a) Lymphocytic Choriomeningitis (LCM)

(b) Sialodacryoadenitis virus

(c) *Toxoplasma sp*

(2) Rats should be monitored for presence of the following:

(a) Murine viruses

1 GD VII

2 H-1

3 KRV

4 LCM

5 Mouse adenovirus

6 Reo-3

7 Polyoma

8 PVM

9 RCV

10 Sendai

(b) Bacteria

1 Salomella sp

2 Corynebacterium sp

3 Pseudomonas sp

(c) Mycoplasma sp

(d) Internal and external parasites

(e) Protozoa

1 Toxoplasma sp

2 Encephalitozoon sp

c. Hamsters

(1) Hamsters must be free from evidence of the following:

Lymphocytic Choriomeningitis (LCM)

(2) Hamsters should be monitored for the following:

(a) Murine viruses

1 GD VII

2 LCM

3 PVM

4 Reo-3

5 Sendai

6 SV-5

(b) Salmonella spp

(c) Internal and external parasites

d. Guinea Pigs

(1) Guinea pigs must be free from evidence of the following:

(a) Lymphocytic Choriomeningitis (LCM)

(b) *Salmonella sp*

(2) Guinea pigs should be monitored for the following:

(a) Murine viruses

1 GD VII

2 LCM

3 PVM

4 Reo-3

5 Sendai

6 SV-5

(b) Bacteria

1 *Salmonella sp*

2 *Streptococcus pneumoniae*

3 *Bordatella bronchiseptica*

4 *Klebsiella spp*

5 Lansfield group C streptococci

6 *Streptococcus zooepidemicus*

(c) Internal and external parasites

e. Rabbits

(1) Rabbits must be free from evidence of the following:

(a) *Treponema cuniculi*

(b) Encephalitozoon cuniculi

(c) Toxoplasma gondii

(2) Rabbits should be monitored for presence of the following:

(a) Bacteria

1 Enteropathogenic E. coli

2 Pasteurella multocida

3 Bordatella bronchiseptica

4 Treponema cuniculi

5 Listeria monocytogenes

(b) Mycoplasma sp

(c) Internal and external parasites

(d) Protozoa

1 Encephalitozoon cuniculi

2 Toxoplasma gondii

f. Nonhuman Primates

(1) Nonhuman primates must be free of the following:

(a) Pathogenic Mycobacterium sp

(b) Herpes spp

(c) Monkey pox

(d) Simian hemorrhagic fever

(2) Nonhuman primates should be monitored for evidence of presence of the following:

(a) Pathogenic Mycobacterium spp.

(b) Shigella spp

(c) Salmonella spp

(d) Internal and external parasites

4. PROCEDURES

a. Mice, Rats, and Hamsters.

(1) General Examination - Gross, physical examination of all animals upon arrival will be made by a qualified DVM or a trained technician under the supervision of a qualified DVM. Inactive, sick or moribund, or dead animals will be necropsied for gross histopathological evaluation.

(2) Quality Control Monitoring.

(a) Animals from all suppliers will be monitored under this program. Five (5) animals will be chosen at random (once a month or once from each purchase order, whichever is less frequent) and be used for quality control monitoring.

1 The intestinal contents will be cultured utilizing the isolation scheme outlined in Appendix A.

2 A fecal examination for intestinal parasites will be performed utilizing the procedures detailed in Appendix B.

3 Examination for ectoparasites will be performed on any animals exhibiting suspicious lesions (Appendix D).

4 A complete histopathological examination will be performed by Pathology Division.

5 Serum collected from each animal will be examined for antibody titers to murine viruses as outlined in Appendix D.

(b) Once the mice, rats, and hamsters have passed through the initial quarantine period five (5) animals will be taken from each room in which more than 100 animals are housed at 3 month intervals and used for quality control monitoring in the same manner.

b. Guinea Pigs.

(1) General Examination - The examination will be the same as for the

small rodents, with particular attention given to palpating the mandibular lymph nodes.

(2) Quality Control Monitoring

(a) Two (2) animals (each month or from each shipment, whichever is most infrequent) will be selected at random and sacrificed for the following quality control procedures:

1 Microbiological screening - Culture the intestinal contents as outlined in Appendix A.

2 Parasite screening - Feces will be collected from the shipping container and examined for the presence of ova as outlined in Appendix B.

3 Examination for extoparasites will be performed on any suspected animals (Appendix D).

4 A complete histopatholic examination will be performed by the Pathology Division.

5 Virus screening - Appropriate serologic testing will be performed to detect the presence of viral antibodies as outlined in Appendix D.

(b) Once the guinea pigs have passed through the initial quarantine period two (2) animals will be taken from each room in which more than 100 animals are housed at 3 month intervals and used for quality control conitoring.

c. Rabbits.

(1) General Examination - All animals will be physically examined by a qualified DVM or a trained technician under the supervision of a qualified DVM. Particular attention should be given to examination of the ears for mites, and the lips, nose, and genital area for lesion of syphilis. Animals received with apparent illness or abnormality will be necropsied and a histopathological examination will be conducted.

(2) Quality Control Monitoring.

1 Microbiological screening - Two rabbits will be selected at random from each delivery and the following examinations will be performed.

a Fecal droppings or rectal swabs will be cultured for enteropathogenic bacteria (See Appendix A).

b Nasal or nasopharyngeal swabs will be cultured from each rabbit for Pasteurella multocida and Bordatella bronchiseptica (See Appendix A).

2 Parasite Screening - A fecal examination will be performed from at least ten (10) animals from each group received (See Appendix B).

3 Examination for extoparasites will be made of any suspicious lesions (See Appendix C).

4 After each group of animals has been through the quarantine period, the following procedures will be performed on a monthly basis:

a Examination of the ears for mites and treatment with two (2) drops of Canex^{R}: mineral oil diluted 1:3.

b Examination of feet for overgrown toenails.

c Examination of the mouth for overgrown teeth.

d Fecal examination from at least ten (10) animals from each room.

d. Primates.

(1) The procedures for in-processing and quarantine will be performed as directed by Appendix E.

(2) Microbiological screening.

(a) Any oral lesions (gingivitis) suggestive of Shigella spp.

(b) Rectal cultures will be taken from animals exhibiting intestinal problems and cultured for enteric pathogens (Appendix A).

(3) Periodic routine care will be performed as directed by Appendix F.

5. QUALITY OF THE WATER SUPPLY.

A random sample of water supply will be cultured for Pseudomonas and coliforms on a monthly basis. The procedures outlined in Appendix G are to be followed for isolation of these organisms.

6. EFFICACY OF SANITATION OF WATER BOTTLES AND SIPPER TUBES.

A monthly evaluation of the procedures for sanitation of water bottles

and sipper tubes will be made. The procedures for this evaluation will be performed as outlined in Appendix G.

HARRY ROZMIAREK
LTC, VC
Chief, Animal Resources Division

APPENDIX A

PROCEDURE FOR COLLECTING, HANDLING, INOCULATING, INCUBATING, AND IDENTIFYING BACTERIAL SPECIMENS

A. COLLECTION OF SPECIMENS.

1. Fecal droppings - A representative sample may be collected from the shipping container, holding pan, or catch pan.

2. Fresh feces - Using sterile swabs (culturettes^{R}), a specimen can be collected from the small intestine, cecum, or colon.

3. Pathologic specimens - Lesions observed at necropsy will be cultured with sterile swabs (Culturettes^{R}) using aseptic technique.

B. HANDLING OF SPECIMENS.

Specimens must be either cultured or refrigerated within 30 minutes of collecting. For specimens likely to contain anaerobes, speed of culturing is essential, as even a few minutes' exposure to air may kill them.

C. PROTOCOL.

1. Media to be used:

a. Gram Negative Broth (GN) - A selective or enrichment broth for gram negative organisms (g-), especially Salmonella and Shigella spp.

b. Thioglycolate Broth (thio) - A general enrichment broth. A tube of this broth must be at least 3 inches deep to permit growth of anaerobes. If the indicator starts to turn, heat the broth for 10 minutes in boiling water to drive off dissolved oxygen, and let it cool before inoculating. This can be done only once. To preserve its anaerobic environment at the bottom of the tube, this broth must be kept in an upright position at all times.

c. Salmonella-Shigella Agar (S.S) - A selective agar for Salmonella and Shigella spp., but especially good for Salmonella.

d. Pseudocel Agar (Pseud) - A selective agar for Pseudomonas spp.

e. Sheep Blood Agar (BA) - A general purpose enrichment agar, suitable for the growth of most organisms.

f. Ozide Blood Agar (ABA) - A selective agar for gram positive organisims (g+). It is less inhibitory to streptococci than phenethyl alcohol agar.

g. Mac Conkeys Agar - A selective agar for isolation and differentiation of gram negative organisms.

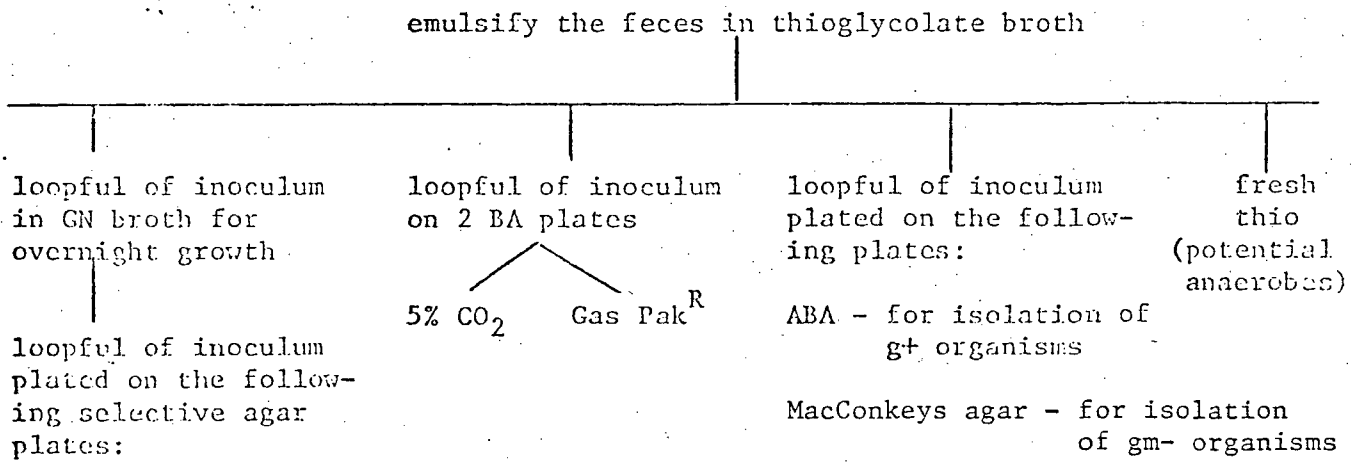
2. Storage of Media:

a. Plated media will last longer if each plate is sealed in plastic: wrap in plastic, rool the end over several times, and tape or staple.

b. Most media will last longer in the refrigerator, but thioglycolate must not be refrigerated.

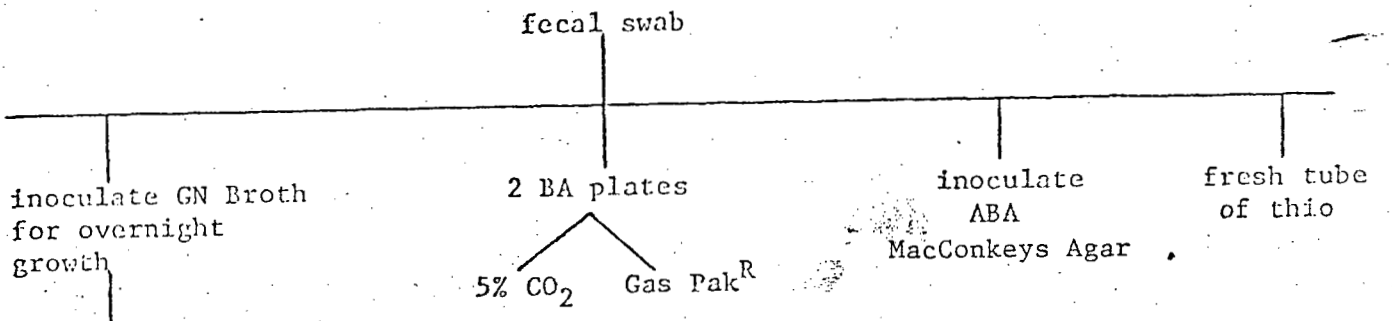
3. Inoculation Scheme:

a. Fecal pellets or droppings

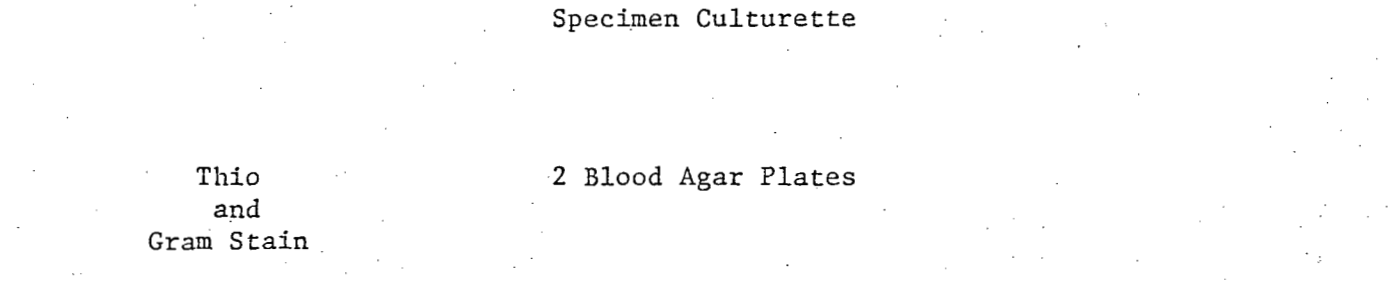


S.S.- for isolation of Salmonella spp. and Shigella sp.
Pseud - for isolation of Pseudomonas spp.

b. Fecal swabs -



c. Pathologic lesions -



4. Incubation

a. Temperature - 35-37°C, no higher.

b. Environment:

(1) All selective media and broth are incubated aerobically.

(2) It may be desirable to incubate one BA in 5% carbon dioxide in air (candle jar) and a second BA anaerobically by use of the Gas Pak^R system. The unbreakable jar should last indefinitely, the "disposable" containers can be reused 10 to 15 times, but will not retain their integrity forever in a drawer. Use of the anaerobic indicators is essential.

5. Evaluation.

a. After 18-24 hours, examine everything except the anaerobic plates (remain unbroken for 2 days).

(1) Report everything that grows

(2) Report the amount of growth as "light", "moderate", or "heavy."

b. Sub sulture from each thioglyiollate tube

c. Gram stain each unidentified colony

d. Record the results

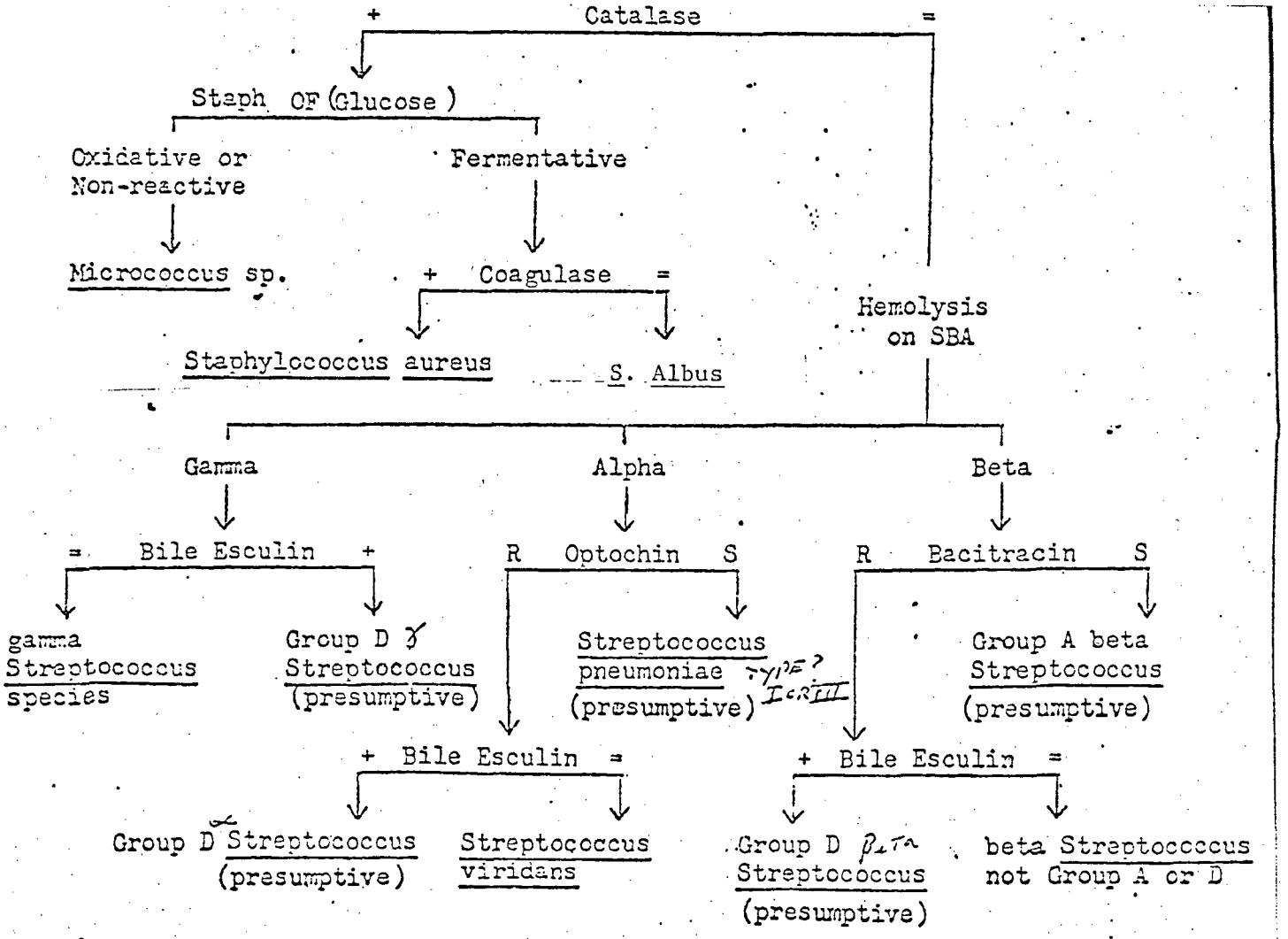
e. If no growth occurs in either the broth or on the plates, report "No growth in 24 hours", and incubate broth and plates another 24 hours.

f. If there is growth in the broth, but not on the plates, subculture again onto all plates. Gram stain from the broth.

6. IDENTIFICATION.

1. Use the RB system for enteric bacteria.

2. Use the following scheme for identification of gram positive cocei



APPENDIX B

PROCEDURE FOR ISOLATION OF PASTEURELLA
AND BORDETELLA FROM NASAL SWABS OF RABBITS

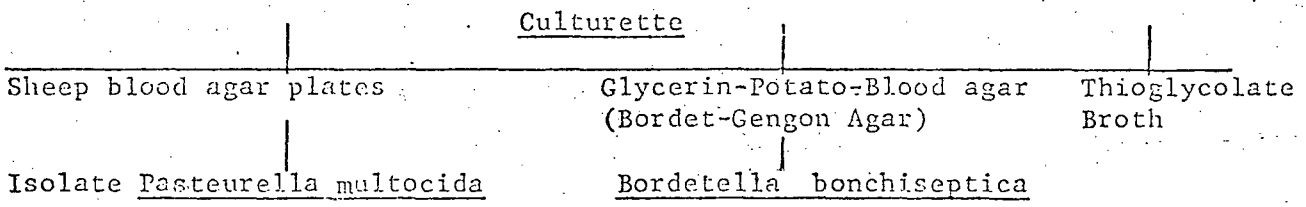
A. Procedure for sampling:

1. Restrain the rabbit manually or in a rabbit holder. Care must taken to prevent the unnecessary occurence of broken backs.

2. Insert a sterile swab (culturette) into each nasal passage as far distally as it will go without force.

B. Inoculation, incubation, and identification:

1. Inoculate the appropriate media using the following scheme:



2. Incubation

a. Incubate the BA at 37 degrees C overnight.

b. Incubate the Bordet-Gengon Agar at 37 degrees C in a candle jar for 2-5 days.

c. Incubate the thioglycolate at 37 degrees C.

3. Indentification - will be performed using the procedures outlined in TM 8-227-5 ("Laboratory Procedures in Clinical Bacteriology") or any comparable clinical microbiology text.

APPENDIX C

SODIUM NITRATE ($NaNO_3$) FECAL FLOTATION PROCEDURE: A QUALITATIVE CONCENTRATION METHOD FOR FRECAL EXAMINATION

A. MATERIALS:

1. Coverglasses
2. Forceps
3. Flotation solution
4. Gauze, 4" x 4"'s
5. Glass marking pencil
6. Lens paper
7. Microscope
8. Microscope lamp
9. Microslides
10. Plastic vials
11. Tongue depressors
12. Waste container
13. Wooden sticks

B. COLLECTION OF FECAL SPECIMENS.

1. Fecal pellets - may be collected from the shipping container, the holding pans, or catch pans.

2. Fresh feces - may be collected from the cecum or colon at time of post mortem examination.

C. PROCEDURE.

1. The fecal sample should be moist. If not, add enough water to soften it.

2. Place two plastic vials on the table. Number them with the glass marking pencil or otherwise identify them with the source of the sample.

3. Using a tongue depressor, transfer 1-2 grams of feces to one of the vials.

4. Add enough of the $NaNO_3$ solution to fill the vial.

5. Using a tongue depressor, stir until the feces is thoroughly suspended in the $NaNO_3$ solution.

6. Pour the contents of the vial through two folded 4" x 4" gauze pads into a second vial. Use the tongue depressor to gently press excess fluid from the debris remaining in the folded 4" x 4"'s. Discard the debris into the waste container.

7. Fill the second vial to the top with $NaNO_3$ until a meniscus is formed. From here several alternatives are available:

a. Immediately after filling, cover with a slide and let set for 10-15 minutes.

b. Or, let the filled vial set for 10-15 minutes, then sample the center of the meniscus by

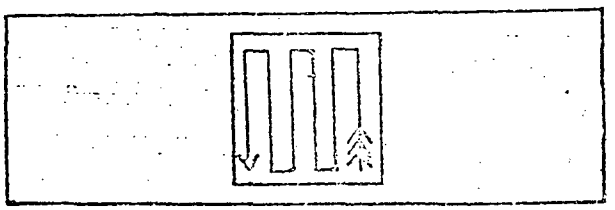
(1) Lighly touching it with a slide, which is quickly flipped over,

(2) Or, by lightly touching it with a cover slip and placing the coverslip onto a slide.

c. Or, touch the center with a headed glass rod and transfer to a slide.

8. Regardless of the method used, the slide should be examined after the application of a coverslip with a pair of coverslip forceps. Lower one edge of the coverglass onto the slide near the drop of suspension, then release the forceps as the coverglass is gently lowered onto the drop. The fluid should spread out evenly under the coverglass. Too rapid an application of the coverglass will probably result in the formation of air bubbles, which may interfere with the microscopic examination of the specimen. Avoid pressure on the coverglass because parasitic forms are easily mutilated.

9. Place the slide on the stage of the microscope so that the near right-handed corner of the coverglass is centered under the low magnification (10x) objective. Focus on this corner. Adjust the substage condenser and diaphragm of the microscope so as to see a distinct image of the suspension under the coverglass. Using the low magnification (100x), systematically move the microslide back and forth until the entire area of the coverglass has been scanned (see diagram below). Objects having a resemblance to parasite forms may be centered and examined under high magnification (400x). Always return to low magnification (100x) for further search of the specimen.



The material under the coverglass should be systematically examined at 100 magnification according to this diagram.

If worm eggs and coccidial oocysts or other protozoa are present in the same specimen, the coccidia and giardia, being smaller objects, tend to float upward until they rest directly beneath the coverglass. Therefore, when the worm eggs are in focus under high magnification (x400), the coccidia and giardia, may be out of focus and vice versa. All three types of parasitic forms may be brought clearly into focus by turning the fine-adjustment knob of the microscope. Endoparasites such as: Hexamita muris, Entamoeba muris, Syphacia obvelata, Aspicularis tetraptera, Heterakis spumosa, Humenolepis nana and Hymenolepis dimunuta will be identified.

The above information is based on materials and procedures referenced in Veterinary Clinical Parasitology by Margaret Sloss, DVM, MS.

APPENDIX D

PROCEDURES FOR IDENTIFICATION OF ECTOPARASITES

A. Materials

1. Applicator, cotton tipped
2. Black paper
3. Coverglass
4. Coverglass Forceps
5. Dissecting needle
6. Hand Magnifier
7. Hoyer's solution
8. Jar for waste
9. Medicine dropper
10. Microscope
11. Microscope lamp
12. Microslides
13. Light lubricatine oil and dispenser
14. Scalpel
15. Towels, or "Wipes"

1. Applicator, cotton tipped. Wooden applicator sticks, 15 cm. (6 in.) in length, are tipped with absorbent cotton. These are for the removal of mites from the ear canals.

2. Black paper. Sheets of dull-surfaced black paper abour 15 cm. (6 in.) square are used as backgrounds in the detection of mites, either grossly or with the aid of a hand magnifier.

3. Coverglass. Any 18 or 22mm. (3/4 or 7/8 in.) square glass or plastic coverglasses are suitable.

4. Coverglass forceps. This should always be used when applying coverglasses to microslides.

5. Dissecting needle. A wooden-or metal-handled needle is used for picking up individual mites. A stiff sewing needle 5 cm. (2 in.) long may be set in a 10 cm. (4 in.) length of 6 mm. (1/4 in.) wooden dowel rod.

6. Hand magnifier. This should provide a magnification of x 3 or more for the examination of mites, ear canal surfaces, or ear swabs. A self-illuminating otoscope may also be used for this purpose.

7. Hoyer's solution. Mites may be permanently fixed in this fluid when mounted on a microslide under a coverglass.

8. Jar for waste. Mites may live for hours after their removal from the host. Discarded swabs, "wipes," and slides may be disinfected by placing them in a covered jar containing 3 per cent saponated cresol solution.

9. Medicine dropper. For the transfer of Hoyer's solution to a microscope.

10. Microscope. The same type of microscope and its equipment is recommended as that used for fecal examination (page 8). Lens paper should be used to maintain clean objectives, oculars, condenser, and mirror.

11. Microscope lamp. That used for fecal examination is recommended for mite identification.

12. Microslides. These are standard 75 x 25 mm. (3 x 1 in.) glass slides . They should be washed and dried before using (if not purchased clean) and they may be used repeatedly.

13. Oil and dispenser. Any light-bodied lybricating oil may be used to mount mites temporarily on a microslide under a coverglass. The oil may be dispensed from a small bottle provided with a dropper-pipette. Or a small lubricating-oil-can may be used.

14. Scalpel. A detachable-blade scalpel is preferred for scraping the skin. The blade should be convexly curved.

15. Towels or "wipes." Soft woven towels or disposable laboratory "Wipes" are used for drying microslides and for cleaning the scalpel.

B. Technique for Skin Examination

1. Place a drop of light lubricating oil on a microslide.

2. Clean the scalpel blade by wiping it with paper.

3. Dip the clean scalpel blade into the drop of oil on the microslide.

4. Pick up a fold of the patient's skin at the edge of the suspected area, pinching it firmly between the thumb and forefinger. With the oily scalpel, scrape the crest of the fold several times in the same dircetion. Scrapings will adhere to the blade. Stop Scraping when a slight amount of blood appears.

5. Transfer the scraping from the scalpel blade into the drop of oil on the microslide, using a slight rotary motion.

6. Apply a coverglass to the scraping on the microslide by gently lowering it by means of a coverglass forceps. Additional oil may be added at the covergalss edge in order to fill the space beneath it. Do not press on the coverglass.

7. Examine the preparation under low maginification (x 100) in a methodical manner so that all portions of the coverglass area are seen (Fig.11). For best results, manipulate the substage condenser and diaphragm of the microscope so as to provide a relatively low degree of light, evenly distributed.

    Oily preparations of mites may be kept for days as demonstration specimens. The mites show motion for many hours.

8. A cotton swab is introduced into the external auditory canal and gently rotated. The swab is then placed on a piece of black paper and examined by means of a hand magnifier. Living and dead ear mites may be seen. If necessary, individual ear mites may be transferred on the tip of the dissecting needle from the cotton swab to a drop of oil on a microslide for microscopic examination.

An electrically illuminated otoscope cone may be introduced directly into the ear canal for the detection of ear mites, thus making microscopic examination unnecessary.

The more rapidly-moving, larger skin mites may be captured by touching them with an oily cotton swab. This slows them down so that they may then be transferred to a drop of oil on a microslide for microscopic examination.

For rapid and permanent mounting of mites, Hoyer's solution may be used:

Distilled water.....	50 ml. (1.7 fl. oz.)
Gum arabic flakes (clear crystal)	30 gm. (7.5 dr.)
Chloral hydrate.....	200 gm. (6.7 oz.)
Glycerine.....	20 ml. (5.4 fl. dr.)

The ingredients are mixed in the order given, at room temperature. Store in a tightly sealed container.

Living mites may be directly mounted in this solution. To do this, a drop of Hoyer's solution is placed on a microslide. Use a dissecting needle to transfer one or more mites to the mounting medium on the slide. Gently lower a coverglass on the specimen, using a coverglass forceps. The slide may then be heated gently in order to hasten the fixing and clearing process.

If mites are to be sent to a diagnostician, they may be immersed in a few ml. or 70 per cent ethyl or isopropyl alcohol. Skin scrapings for diagnostic service should be taken from near the edge of an active lesion, avoiding the inclusion of large amounts of dry crusts, hair, or wool. Dried specimens are usually of no value for the identification of mites.

1. Method of examining mice for lice and non-follicle-inhabiting mites:

    1. Kill the mouse and place it onto a piece of black paper the edges of which are entirely surrounded with cellophane tape, sticky side up, or into a high walled container such as a crystallizing dish.

    2. After 12-20 hours (overnight), discard the carcass and examine the paper or the bottom of the container with a dissecting microscope (100x).

    3. If mites are present mount typical specimens using teasing needle, microscope slide, coverslip, and mounting fluid (for temporary mounting use paraffin oil; for a permanent mount use Hoyer's modified Berlese solution and examine microscopically (100x).

    4. The most frequently observed species of non-follicle-inhabiting mites. Myobia musculi, Radfordia affinis, Myocoptes musculinus, and Myocoptes romboulsi, and the louse, Polyplax serrata.

2. Method of examining mice for follicle-inhabiting mites:

    1. Kill the mouse and cut through the skin completely around the torso (avoid cutting the peritoneum).

    2. Pull the skin forward and backward (turning it inside out) and examine the insied surface for white nodules.

    3. If nodules are present, tease out the contents, mount as above, and examine microscopically (100x)

    4. The most frequently observed follicle-inhabiting mite is Psorergates simplex.

The above information is based on materials and procedures referenced in Veterinary Clinical Parasitology, by Margaret Sloss, DVM, MS

APPENDIX E

QUALITY CONTROL IN NON-HUMAN PRIMATES

A. Newly arrived primates

Upon arrival a veterinarian examines each monkey and determines whether or not it will be accepted. If accepted the folowing quality assurance steps are taken:

1. Internal parasite checks are conducted within 5 days of arrival and again at 4 weeks following arrival (See Appendix C).

2. Five to seven days following arrival, 10ml of blood is drawn and used to determine HA antibody titers to SEA, SEB, SEC and HAI antibody titers to the group B arboviruses.

3. The monkeys are TB tested 5 to 7 days following arrival during week 3 and again during week 5. 0.1ml of mammalian tuberculin is given ID in the palpebrum on the same side in all monkeys unless otherwise noted. The side used is alternated with each test period.

4. In the event that a monkey dies the pathologist on call is notified immediately and conducts a necropsy examination. A necrospy protocol is forwarded to him ASAP.

B. Quality control in the established primate colony.

A veterinarian is assigned to provide health care for the primate colony. His duties include daily rounds and treatments. In addition, the following quality assurance steps are taken:

1. Internal parasite checks are made quarterly on 3 animals (randomly chosen) per room. If any specimens are found to be positive, fecals are examined on all monkeys in that room.

2. On a quarterly basis, all nonhuman primates are TB tested using the above technique (A3 above).

3. Large canine teeth are extracted on newly arrived monkeys before being issued to an investigator. Other monkeys are examined when they are returned to AR Division for reissue and if canine teeth extraction is indicated, the procedure is done at that time.

4. In the event that a monkey dies the pathologist on call is notified immediately and conducts a necropsy examination. A necropsy protocol is forwarded to him ASAP.

APPENDIX F

PROCEDURE FOR THE MONTHLY MONITORING OF THE USAMRIID WATER SUPPLY AND THE EFFICIENCY OF THE SANITIZING OF WATER BOTTLES AND SIPPER TUBES

A. Sampling of the water

1. Procedure for sampling:

a. Inoculate approximately 1 ml of water into 9 ml of thioglycolate broth, incubate at 37 degrees C for 3 days, and then incubate at room temperature for 3 days (NIH method).

b. In the event of growth, innoculate the following agar plates:

1. Pseudocel - for the isolation of Pseudomonas spp.

2. Levine Eosin Methylene Blue - For the isolation of coliform organisims in materials of sanitary significance.

c. Identify any growth using the procedures referenced in TM 8-227-5("Laboratory Procedures in Clinical Bacteriology") or on conparable clinical microbiology text.

d. In the event of no growth after 6 days, record as "No Growth".

2. Frequency of sampling - this procedure will be performed randomly on a monthly basis from any of the animal holding rooms or the cage wash area.

B. Culturing of water bottles and sipper tubes:

1. Procedure for sampling:

a. Sample water bottles and sipper tubes that have had time to dry, cool down, and are ready for use within the colony.

b. Sterile swabs (culturettes)* will be sued to culture the sipper tubes and water bottles.

c. Swab the areas most likely to yield growth:

1. Bottles - angular areas, such as the bottom, neck and mouth.

2. Sipper tubes - the inside lip of the tube.

d. After inoculating a tube of thioglycolate broth, the same procedure as listed in A.1a will be followed.

*When culturing a dry surface, break the transport medium compartment located at the end of the culturette tube so that the swab is moistened This should increase the likelihood of recovering organisims.

HSWP-QHP
MEMO #8 (Annex F)

12 July 1979

ANNEX F

USAMRIID SOP

WEEKEND AND HOLIDAY DUTY AND EMERGENCY SERVICE

18 March 1977

ANIMAL RESOURCES DIVISION
U. S. ARMY MEDICAL RESEARCH INSTITUTE OF INFECTIOUS DISEASES
FORT DETRICK, FREDERICK, MARYLAND 21701

STANDING OPERATING PROCEDURE 18 March 1977

WEEKEND AND HOLIDAY DUTY AND EMERGENCY SERVICE

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DUTY ASSIGNMENTS	3
DUTY ROSTERS	4
CHANGES IN DUTY ROSTERS	5
DISTRIBUTION OF ROSTERS	6
ABSENCES FROM DUTY	7
ANIMAL CARE POLICY FOR WEEKENDS AND HOLIDAYS	8
SICK ANIMALS	9
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1. PURPOSE.

To insure that all animals maintained by USAMRIID receive the same quality of husbandry, medical care, and emergency service on the weekends, holidays, and after normal duty hours that they are accustomed to during normal duty hours.

2. DUTY HOURS.

A tour of duty shall be defined as follows:

a. Military Personnel.

(1) Normal duty hours (Monday - Friday)- - - -0745-1630 hours

(2) After normal duty hours (Monday - Friday)-1630-0800 hours the following morning.

(3) Weekend duty hours (Saturday - Sunday)- - 1630 hours Friday evening to 0800 hours Monday.

(4) Holiday duty hours - - - - - - - - - - - - -1630 hours the preceeding day to 0800 hours the day following the holiday.

ANNEX F

b. Civilian Personnel.

(1) Normal duty hours (Monday - Friday)- - - -0745-1630 hours

(2) After normal duty hours (Monday - Friday)-Civilians are not normally scheduled for after duty hours.

(3) Weekend duty hours (Saturday - Sunday)- - 8 hours of duty must be performed between 0600-1800 hours each day.

(4) Holiday duty hours - - - - - - - - - - - - -Civilians are not normally scheduled for duty on holidays.

3. DUTY ASSIGNMENTS.

All duty assignments for weekend, holiday, and after normal duty hours during the week will be made by the NCOIC, AR Division. This includes military as well as civilian personnel.

4. DUTY ROSTERS.

The rosters for weekend and holiday duty for both military and civilian personnel will be prepared by the NCOIC, AR Division.

a. Weekends. A new roster will be prepared and disseminated to all personnel concerned 2 weeks prior to the expiration of the old roster. This will allow each individual sufficient time to alter his (or her) plans accordingly.

b. Holidays. Civilians are not normally scheduled for duty on holidays. Therefore, only military personnel will be scheduled by roster for this duty. Each division is responsible for insuring that adequate care is provided by trained personnel within their own division. If none are available, personnel from AR Division will be responsible for providing the necessary coverage. The NCOIC of AR Division will coordinate with each division NCOIC to insure that these requirements are met.

c. "On call" Status.

(1) An "on call" roster will be established by each division NCOIC for use in case civilian or military personnel call in sick.

(2) The "on call" roster will consist of trained personnel within each division.

(3) The individuals designated as "on call" will remain by their telephone until 0900 hours on their day of duty. If no requests are made for their services by 0900 hours, they are excused from duty.

(4) Each division NCOIC will provide the NCOIC, AR Division with the name and telephone number of each person "on call." The NCOIC, AR Division will coordinate with each division NCOIC to insure that adequate coverage is provided.

5. CHANGES IN DUTY ROSTERS.

a. Rosters established by the NCOIC, AR Division will not be changed without the NCOIC's approval.

b. Once approval for a change is made, it will be the responsibility of the NCOIC, AR Division to inform the Staff Duty NCO of all changes.

6. DISTRIBUTION OF ROSTERS.

a. A copy of the weekend and holiday duty roster will be provided to the Staff Duty NCO.

b. On the last workday preceeding a weekend or holiday, the NCOIC, AR Division will prepare a "weekend duty summary" or "holiday duty summary" reflecting the following information:

(1) Veterinary officer on duty and his telephone number.

(2) Veterinary technician on duty and his telephone number.

(3) Animal caretaker assignments by suite and their telephone numbers.

(4) Military people "on call" for each division:

(a) His (or her) telephone number.

(b) The name and number of the responsible individual (the NCOIC usually) to call for backup if unable to reach the individual scheduled for duty.

Copies of the above "summary" will be furnished to the Staff Duty NCO and the veterinary officer on duty.

7. ABSENCES FOR DUTY.

a. Military personnel scheduled for weekend or holiday duty will not call in sick. If military personnel scheduled for duty are ill, they will report to the dispensary (or Ward 200) for sick call by 0730 hours, and notify the Staff Duty NCO by 0830 hours if they are placed "on quarters." The Staff Duty NCO will then notify the scheduled "on call" individual.

b. Civilian personnel scheduled for duty who call in sick on weekends will notify the Staff Duty NCO by 0800 hours that day. He will in turn notify the scheduled "on call" individual.

c. The "on call" person will remain by his telephone until 0900 hours. If his (or her) services are not called for by then, he (or she) is excused from duty. The "on call" person will follow the procedure as described in a. above.

8. ANIMAL CARE POLICY FOR WEEKENDS AND HOLIDAYS.

Personnel scheduled for duty on weekends and holidays will insure that proper care of animals is adhered to and should not deviate from normal animal care as provided during the weekdays. The policy listed below will be adhered to by personnel working on weekends and holidays. For a more complete description of the routine daily animal care requirements for each species, see the following SOP's:

ANIMAL RESOURCES DIVISION SUITE #5 - 27 January 1977

PRIMATE ANIMAL CARETAKERS - 17 January 1977

a. Monkey Colonies.

(1) Lights will not be turned on before 0600 hours or turned off before 1400 hours.

(2) Racks will be cleaned with brush, disinfectant and/or detergent and rinsed with water as normally done on weekdays. Cleaning will not commence before 0800 hours.

(3) Animals will be fed twice per day.

(4) Insure that water hoses and nipples on racks are functioning properly, and have no leaks.

b. Rabbits.

(1) Insure that rabbit food hoppers are free of dust and only pelleted food is within reach of rabbit.

(2) Insure water bowls are cleaned and replenished with water.

(3) Insure that racks are cleaned properly and thoroughly.

c. Mice and Rats.

(1) Insure that water bottles are replenished daily.

(2) Insure food hoppers are replenished.

(3) Dusting or cleaning of racks as needed.

d. Guinea Pigs.

(1) Insure water bottles are replenished daily.

(2) Insure food hoppers are replenished and are free of dust on bottom of hoppers.

9. SICK ANIMALS.

a. The military person on duty will insure that any sick animal is brought to the attention of the Division Duty Officer and to treat the animal or animals as instructed by him.

b. Animal Resources Division is also responsible for the care of animals including cleanliness of room and treatment of sick animals in Building 1412, Room 207, or any cold animal holding area in Building 1412 as instructed by Division NCOIC or Division Duty Officer. Therefore, the military person or civilian caretaker on duty will insure that the above is accomplished as required on weekends.

10. EMERGENCY SERVICE.

a. The veterinary officer and technician who perform duty on a holiday or weekend are responsible for any emergency service required during their tour of duty.

b. The veterinary officer and technician who perform duty on a weekend are also responsible for providing any emergency care after normal duty hours the following week, from 1630 hours Monday - 0800 hours Friday, with the exception of holidays.

c. If the designated personnel plan to be away from their home phone during a tour of duty, they should coordinate their whereabouts with the Staff Duty NCO.

Harry Rozmiarek

HARRY ROZMIAREK
LTC, VC
Chief, Animal Resources Division

ITEM 23

PROCEDURES AND PRECAUTIONS FOR USE OF RADIOACTIVE MATERIAL

HEALTH PHYSICS
WALTER REED ARMY MEDICAL CENTER
Washington, D.C. 20012

HSWP-QHP
SOP Number 1-3*

20 April 1979

BIOASSAY PROGRAM

1. PURPOSE. To establish requirements and procedures for internal personnel exposure monitoring except for radioactive iodine and tritium. Bioassay requirements when using radioactive iodine are contained in SOP 1-9, dated 15 November 1978. Bioassay requirements for tritium will be as described in Nuclear Regulatory Commission Staff Position Paper, "Bioassay Requirements for Tritium," dated 19 October 1977.

2. REFERENCES. Models, equations, assumptions and requirements for internal dosimetry are derived from concepts found in International Commission on Radiological Protection Publications 2, 6, 9, 10, 10a and 12; NCRP Report 57 and MIRD.

3. REQUIREMENTS.

a. The objectives of the program are to:

(1) Indicate whether entry of radionuclides into the body has occurred.

(2) Determine the organ or body burden and estimate resultant internal dose.

b. Monitoring for internal deposition of radionuclides will be normally performed only under the following circumstances:

(1) When laboratory surveys indicate frequent or gross contamination.

(2) When air sampling indicates levels of airborne contamination that might lead to internal deposition exceeding 10% of maximum permissible body (organ) burdens.

(3) When operations are performed utilizing large quantities of particulate, gaseous or volatile materials in unsealed form.

(4) When internal deposition of radioactive material is known or suspected.

APPROVED BY THE WRAMC RADIATION CONTROL COMMITTEE ON 11 APRIL 1979

* This SOP supersedes HP MEMO #2, dated 14 May 1974

4. METHODS.

a. One or more of the following methods will be used, as appropriate, for internal exposure monitoring:

(1) Estimation of body burden by analysis of radioactivity in excreta and relation of excretion rate to body burden through biological models.

(2) Estimation of body burden by whole body counting and pulse height analysis.

(3) Estimation of body burden from survey data which permit estimates of intake of radioactive material followed by estimates of body (organ) burden based on biological models.

(4) Chromosomal Analysis.

b. The frequency of measurements depends on the effective half-life of the material in question, variations of excretion rate with time and the recent experience of individuals with respect to internal contamination levels.

c. Evaluation of internal dose will be made using methods described in ICRP 10 and MIRD methods.

d. Doses will be assigned and entered on individual's DD Form 1141 based upon evaluation. Doses will be assigned as one-time exposures and will be the total lifetime dose commitment from the exposure.

5. INVESTIGATIONS AND REPORTS.

a. All dose commitments larger than 1/10 of the annual limit will be investigated by the Health Physics Officer and will be submitted to the WRAMC Radiation Control Committee.

b. Such reports will include pertinent information regarding the dose such as:

(1) Analysis

(2) Time and nature of exposure

(3) Chemical form of isotope

(4) Dosage calculations

(5) Action taken or recommendations

ROBERT M. QUILLIN
LTC, MSC
Health Physics Officer

HEALTH PHYSICS
WALTER REED ARMY MEDICAL CENTER
Washington, D.C. 20012

HSWP-QHP
SOP Number 1-9

15 November 1978

REQUIREMENTS FOR THE USE OF RADIOACTIVE IODINE

1. PURPOSE. To establish the requirements for utilizing quantities of Radioactive Iodine-125 and/or 131 in amounts of 1.0 mCi or greater within the Walter Reed Army Medical Center and tenant units supported by the Health Physics Office, WRAMC.

2. METHODS AND PROCEDURES.

a. All laboratory facilities authorized to utilize radioactive iodine will be equipped with a suitable survey meter. These meters will be calibrated in accordance with current directives by the Health Physics Instrument Calibration Facility. The individual user is responsible for conducting a thorough meter survey of his work area and its vicinity upon completion of any procedure involving radioactive iodine.

b. All procedures involving the use of 1.0 mCi or more of radioactive iodine will be accomplished utilizing an Iodination Box, (Model RM-1, Radiation Physics Inc., or an approved equivalent). In the case of therapeutic usage of radioactive iodine, the vial will be vented inside the approved iodination box prior to being transported to the patient care area. The self-contained charcoal impregnated filter in the Iodination Box will be changed as directed by the Health Physics Officer. Procurement of these filters is the responsibility of the individual user. It is recommended that each user maintain a replacement filter available to prevent interruption of his procedures when replacement is required.

c. Procedures involving the use of radioactive iodine in amounts less than 1.0 mCi, will be accomplished in properly ventilated hoods as approved by the Health Physics Officer.

d. In view of the extensive preparation requirements surrounding the use of radioactive Iodine-131 involving in-patients, the Nuclear Medicine Clinic will coordinate with the Health Physics Office at least 24 hours in advance of a scheduled treatment.

3. MONITORING. Monitoring will be accomplished as follows:

a. Breathing Zone. A sample of air in the vicinity of the user's mouth and nose will be drawn through a four (4) inch charcoal filter at a rate of 10 Liters per Minute (LPM). This will be accomplished using a

* This SOP supersedes HP SOP 1-9 dated 28 February 1978.

APPROVED BY THE RADIATION CONTROL COMMITTEE 31 OCTOBER 1978.

11/12/5

four (4) inch charcoal filter supplied by Health Physics and a vacuum pump or in-house vacuum line. The sample will be collected for a period of time that will encompass the total time that the user is performing procedures involving radioactive iodine. The user will provide the following information for each breathing zone sample:

(1) Name of individual doing the work

(2) Location of the Hood (Building and Room)

(3) Isotope

(4) Amount of Isotope in stock vial

(5) Start-Time and Date

(6) Stop-Time and Date

b. Room Air. A sample of the air which is representative of the air within the room containing the iodination hood will be drawn through a charcoal filter at a rate of 10 LPM. The sample will be collected continuously for a period of one week. If the vacuum system is inadvertently turned off or not operational during the collection of a sample, the individual user will record the time the system was found to be off, turn the vacuum system on, record the time the vacuum system was turned on, and report the occurrence and data to Health Physics.

c. Environment. A sample of the air being discharged to the environment will be collected at a point downstream from the last charcoal impregnated filtration device in the ventilation system. This sample will be collected continuously for a period of one month.

4. EQUIPMENT. The following equipment will be utilized in the collection of samples:

a. Vacuum System. A vacuum pump or an in-house vacuum line capable of maintaining a flow rate of 10 LPM is acceptable. In all cases where an in-house vacuum line is utilized, an additional charcoal impregnated filter will be installed between the vacuum source and the filter used for the sample collection.

b. Filters for Sample Collection.

(1) Type of Filters: A four (4) inch charcoal filter supplied by Health Physics will be utilized for the collection of samples.

(2) Responsibilities:

(a) Breathing Zone Samples - The individual user is responsible for obtaining the appropriate filters from the Health Physics Office, collecting the sample, and causing it to be delivered to the Radioactive Analysis Laboratory (RAL), Health Physics Office. The samples will be secured in a suitable container to prevent possible contamination.

(b) Room Air Samples - The Reactor and Survey Branch (R&S Br), Health Physics Office will be responsible for installation and changing these filters and forwarding them to the RAL for processing.

(c) Environmental Samples - The R&S Br, Health Physics Office will be responsible for installing and changing these filters and forwarding them to the RAL for processing.

(d) The individual user is responsible for periodic monitoring of the flow rate meters in all samples collected for his usage area and assuring that a flow rate of 10 LPM is maintained.

c. Iodination Box and Filters. The procurement of the iodination box and filters are the responsibility of the individual departments and users. It is recommended that each user maintain a supply of replacement filters to prevent interruption of his procedures when replacement is required by Health Physics.

5. BIOASSAY

ACTIVITY LEVELS ABOVE WHICH BIOASSAY FOR I-125 OR I-131 IS NECESSARY

Types of Operation	Activity Handled at Any One Time in Unsealed Form Making Bioassay Necessary* Volatile or Dispersible*	Bound to Nonvolatile Agent*
Processes in open room or bench, with possible escape of iodine from process vessels	0.1 mCi	1 mCi
Processes with possible escape of iodine carried out within a fume hood of adequate design, face velocity, and performance reliability	1 mCi	10 mCi
Processes carried out within gloveboxes, ordinarily closed, but with possible release of iodine from process and occasional exposure to contaminated box and box leakage	10 mCi	100 mCi

* Quantities present may be considered the amount in process by a worker at one time. Quantities in the right-hand column may be used when it can be shown that activity in process is always chemically bound and processed in such a manner that I-125 or I-131 will remain in nonvolatile form and diluted to concentrations less than 0.1 μCi/mg of nonvolatile agent. Capsules (such as gelatin capsules given to patients for diagnostic test(s) may be considered to contain the radioiodine in nonfree form, and bioassay would not be necessary unless a capsule were inadvertently opened (e.g., dropped and crushed). On the other hand, certain compounds where radioiodine is normally bound are known to release radioiodine when the material is in process, and the left hand column may then be applicable. In those laboratories working only with I-125 in radioimmunoassay (RIA) kits, the quantities of I-125 are very small and in less volatile forms, thus, bioassay requirements may be judged from the right hand column.

a. Routine Bioassay using an uptake probe system is necessary when an individual handles, at any one time, unsealed quantities of radioactive iodine that exceeded those shown in the above table.

b. Activities whose personnel use quantities greater than 10% of those listed in the above table must supply the Health Physics Office with the following information:

(1) Name of individual

(2) Individual's unit or office

(3) Isotope used and chemical form

(4) Quantity and specific activity of isotope

This information will be evaluated by the Health Physics Office to determine if bioassay is necessary.

c. All bioassay results will be maintained on Form DD 1141 as required in AR 40-14.

6. THYROID BLOCKING AGENTS. Agents that block the accumulation of radioiodine by the thyroid gland may be permitted for those at risk to the volatization of high specific activity radioiodine used in radioiodination procedures subsequent to a thyroid evaluation and recommendation by the consulting physician in the thyroid clinic that such an agent should be administered.

a. The supervisor of any military or civilian radiation workers performing radioiodination experiments will advise the radiation workers of the standard safety procedures and monitoring required by paragraphs 2 and 3. In addition, the radiation worker will be advised of the possibility of using a thyroid blocking agent prior to the experiment. In the event that the radiation worker agrees to use this additional precaution, the supervisor will send military radiation workers to ASO and civilian radiation workers to the Occupational Health Nurse with a request that a medical consultation be arranged at the Nuclear Medicine Thyroid clinic for a medical evaluation of the worker's thyroid relative to the use of a blocking agent.

b. The responsibilities with regard to recommended usage of a thyroid blocking agent are as follows:

(1) Supervisor:

(a) Advise radiation workers of safe procedures, monitoring requirements and bioassay requirements in using radioactive iodine (sect 2 and 3).

(b) Advise radiation workers of potential use of a thyroid blocking agent at the time of a radioiodination experiment.

(c) Complete a Sick Call Slip requesting a consultation at the Thyroid Clinic for thyroid evaluation with respect to the use of a thyroid blocking agent prior to radioiodination experments. Active Duty Military must present Sick Call Slip to ASO. Civilians must present Sick Call Slip to Occupational Health Nurse.

(2) ASO or Occupational Health Nurse:

Arrange for a consultation at the Thyroid Clinic.

(3) Nuclear Medicine Thyroid Clinic:

(a) Determine the medical advisability of the radiation worker using a thyroid blocking agent and advise the radiation worker as to the advisability/nonadvisability of its use prior to a radioiodination experiment.

(b) Annotate consultation form with:

1. Medical evaluation of thyroid condition.

2. Recommendations regarding use of a thyroid blocking agent to include dose and time to be taken with respect to a radioiodination experiment.

3. Statement indicating that radiation worker has been advised of the hazards of radioactive iodine, the necessity for bioassay and the advisability/nonadvisability of using a thyroid blocking agent.

(c) Supply radiation worker with a prescription (if applicable) to obtain a thyroid blocking agent at WRAMC Pharmacy. (Civilians must obtain concurrence from the Occupational Health Clinic in order to have the prescription filled at the WRAMC pharmacy).

(d) Notify Health Physics Office in writing of those personnel who have been reviewed regarding the use of a thyroid blocking agent to be used in conjunction with radioiodination experiments and the recommendations regarding the use of a thyroid blocking agent.

(4) Health Physics:

(a) Maintain a listing of all radiation workers who have been evaluated in the Thyroid Clinic and recommendation for each worker regarding the use of a thyroid blocking agent.

(b) Notify the radiation worker's supervisor regarding the evaluation and recommendations of the Thyroid Clinic's physician.

7. OTHER PROCEDURES. Any other procedures involving the use of radioactive iodine, not specifically covered by the above will be coordinated with the Health Physics Office.

ROBERT M. QUILLIN
LTC, MSC
Health Physics Officer

ITEM 24

PERSONNEL MONITORING

nn/12/t

Item - 24

HEALTH PHYSICS
WALTER REED ARMY MEDICAL CENTER
Washington, D.C. 20012

HSWP-QHP
SOP Number 1-5

23 April 1979

PERSONNEL DOSIMETRY SERVICE

1. REFERENCES:

a. AR 40-14, "Control and Recording Procedures for Occupational Exposures to Ionizing Radiation."

b. 10 CFR 20, "Standards for Protection Against Radiation."

c. Health Physics SOP 1-3, "Bioassay Program."

2. PERSONNEL DOSIMETRY ASSIGNMENT LEVELS.

An appropriate personnel monitoring device or devices will be assigned to each individual as required by references 1a. and 1b. above. In addition, other personnel monitoring techniques (e.g. bioassay) will be utilized to evaluate personnel dosimetry as deemed necessary by the Health Physics Officer. Personnel monitoring devices will usually be assigned when individuals are likely to receive in excess of the following levels in a three (3) month period:

Whole Body, head and trunk, active blood forming organs, gonads or lens of eye	125 millirems
Skin of the whole body (other than hands and forearms) cornea of the eye, and bone	750 millirems
Hands and wrist, or feet and ankles	1875 millirems
Forearms	1000 millirems
Thyroid, other organs, tissues and organ systems	500 millirems

3. APPLICATION FOR PERSONNEL DOSIMETRY SERVICE.

a. Any individual working with ionizing radiation or in an area where ionizing radiation is being utilized who feels that he/she may receive an

APPROVED BY THE WRAMC RADIATION CONTROL COMMITTEE ON 11 APRIL 1979

accumulated dose equivalent in excess of the above values may make application for personnel dosimetry service from the Health Physics Office, WRAMC, utilizing WRAMC Form 1119. Supervisors will review these forms and make appropriate comments thereon.

b. Supervisors of individuals who are likely to receive occupational radiation doses in excess of the above values must require such individuals to submit an application for Personnel Dosimetry Service (WRAMC Form 1119) to the Health Physics Office, WRAMC, prior to assignment to that work.

c. The procedure and responsibilities for processing the application are as follows:

(1) Individual Application for Personnel Dosimetry Service

The applicant has the responsibility to furnish:

(a) Individual data

(b) Previous occupational exposure history

(2) Statement of Work Conditions/Environment by Supervisor

The supervisor has the responsibility to furnish:

(a) A statement of types of exposures in worker's environment, (e.g., x-ray, neutron, isotope).

(b) A statement that the applicant has been oriented in radiation safety procedures relevant to his/her position.

(3) Evaluation of Application to Determine Need for Personnel Dosimetry Monitoring

The Health Physics Office has the responsibility to:

(a) Review the individual's work areas and sources of ionizing radiation in that environment.

(b) Estimate the monthly dose as a result of such duties.

(c) Recommend the type of monitoring device, if any, that is appropriate to monitor occupational radiation exposure to individual and the frequency of monitoring.

4. ASSIGNMENT OF PERSONNEL MONITORING DEVICE TO INDIVIDUAL

a. The Health Physics Officer will assure that personnel monitoring devices are assigned to individuals based on an evaluation by the Health Physics Office as to the type and quantity of radioactive materials used in the work environment or the radiation sources to which the individual is exposed.

b. If in the judgment of the Health Physics Officer, workers have the potential of receiving an accumulated dose equivalent of radiation in excess of the values in paragraph 2 above, an appropriate personnel monitoring device will be assigned to the worker. Bioassay may also be required when necessary. Examples of personnel monitoring are as follows:

(1) Personnel in the Diagnostic Radiology Service who routinely take x-rays will be issued a whole body film badge.

(2) Ward personnel providing nursing service to brachytherapy or iodine therapy patients will be issued a whole body film badge or personnel dosimeter for the duration of that procedure.

(3) The radiopharmacist and other personnel involved in nuclear medicine preparations will be issued a whole body film badge and a TLD ring badge.

(4) Researchers performing radioiodinations will be required to have their thyroid monitored for any uptake of iodine.

(5) Each WRAMC fire station will be issued six pocket dosimeters to be utilized in the event that fire department personnel respond to a fire in a radiation area.

5. DISTRIBUTION AND COLLECTION OF PERSONNEL MONITORING DEVICES

a. The supervisor of each major activity utilizing the Health Physics Personnel Dosimetry Service will appoint a personnel dosimetry coordinator. The Health Physics Office will be notified promptly of changes in personnel dosimetry coordinators.

b. Responsibilities of Personnel Dosimetry Coordinator are as follows:

(1) Assist incoming personnel in completing Personnel Dosimetry Service Application (WRAMC Form 1119) and arrange for a radiation safety briefing.

(2) Forwarding of applications to the Health Physics Office.

(3) Coordinate distribution and collection of personnel dosimetry devices for personnel in his activity.

(4) Coordinate bioassay schedules for personnel in his activity.

(5) Notify Health Physics Office of all departing personnel who utilize the personnel dosimetry service.

6. MAINTENANCE AND REVIEW OF OCCUPATIONAL EXPOSURE RECORDS (DD FORM 1141)

The Health Physics Office has the responsibility to assure that:

a. DD Form 1141 will be maintained for all personnel participating in Film Badge and/or Bioassay Service.

b. Occupational exposure records will be reviewed at least quarterly.

c. Monthly exposure records will be reviewed and unusually high exposures will be investigated. The ALARA dose concept is implemented.

7. TERMINATION OF PERSONNEL DOSIMETRY SERVICE

Upon termination of personnel dosimetry service for an individual, the Health Physics Office will complete the DD Form 1141 and annotate the WRAMC Form 1119. These forms will be maintained in accordance with references 1a. and 1b. and AR 340-18-6. Individuals will be furnished notifications and reports as required by 10 CFR 19.

ROBERT M. QUILLIN
LTC, MSC
Health Physics Officer

SDP/ENFORCEMENT PANEL WORKSHEET

EA: 02-169
Date of Panel: August 20, 2002
Licensee: Department of the Army - Walter Reed Army Medical Center (WRAMC)
Facility/Location: Washington, D.C.
License Type: Medical Broadscope
Docket No.: 030-01317
License No.: 08-01738-02
Inspection Report No: 2002-001
Last Date of Inspection: July 19, 2002
Date of Exit Meeting Date: July 19, 2002 (Original)

Panel Chairman (SES Sponsor): F. Costello
Responsible Branch Chief/Lead Inspector: P. Henderson
Enforcement Representative: R. Urban, D. Holody
Other regional attendees: B. Fewell, R. McKinley
Headquarters attendees: D. Broaddus, S. Merchant

1. Brief Summary of Issues/Potential Violations:

During an inspection conducted July 16-19, 2002, a DNMS inspector reviewed the circumstances surrounding a non-reportable event [i.e., lost material greater than 10 times appendix C, but less than 1000 times appendix C, that was retrieved before 30 days - 10 CFR 20.2201(a)(1)(ii)] that occurred on April 27, 2001, at Walter Reed Army Medical Center (WRAMC). Specifically, on April 27, 2001, the licensee's Radiation Protection Officer (RPO) was notified by the waste site that WRAMC waste had triggered the alarm at a Washington, DC waste consolidation site. Upon notification, Health Physics staff were dispatched to the waste site and found that folded or crumpled masking tape was the source of the radioactivity. It was recovered and taken back to the licensee's facility for further identification. The radioactive material was initially thought to be liquid iodine-131 contamination. Health Physics staff attempted to notify the Nuclear Medicine Service, but all staff had left for the day. Health Physics staff held the radioactive material over the weekend for further decay and analysis the following Monday. On Monday April 30, 2001, Nuclear Medicine Service staff informed Health Physics staff that there had been no use of iodine-131 during the previous week. However, still believing that the contaminated tape was a product of Nuclear Medicine Service, Health Physics staff continued to investigate Nuclear Medicine's use and disposition of radioactive material.

On April 25, 2001, the Radiation Oncology Department performed a brachytherapy treatment using 25 ribbons, each containing 11 iridium-192 (Ir-192) seeds with each seed containing 0.381 millicuries (mCi) activity. In preparation for this treatment, Radiation Oncology received a shipment of 30 ribbons, each containing 13 Ir-192 seeds (on April 25, 2001). In the licensee's source storage room, 25 of the 30 ribbons were customized for patient use by immobilizing the end of each of the 25 ribbons with masking tape and

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removing 2 seeds from each ribbon. The 5 extra ribbons and the 25 sub-strands (containing 2 seeds each) were not used for patient treatment and were placed into a lead pig for storage in the source storage room. The licensee believed that they had removed all of the 2 seed sub-strands from the masking tape and placed them in the lead pig in the source storage room. On Monday, April 30, 2001, prior to returning the shipment to the supplier, an inventory was performed of all ribbons and sub-strands. The inventory determined that one sub-strand of 2 seeds was missing. A search was initiated immediately for the missing sub-strand and continued until the next day. On May 1, 2001, Radiation Oncology staff called the Health Physics Office and reported that they could not locate 2 Ir-192 seeds (total activity 0.762 mCi).

Upon receipt of the report from Radiation Oncology, Health Physics staff separated the masking tape with a remote handling tool and visually identified and confirmed that they had recovered the missing Ir-192 seeds. Verification of the source was not made earlier since Health Physics staff believed that the masking tape was contaminated with iodine-131, and they were still evaluating the decay pattern to identify the isotope.

The licensee determined that the two seeds: 1) had remained on the masking tape at the time of customization of the ribbons for patient treatment; 2) had inadvertently been placed in the normal trash in the source room rather than in the lead container; and 3) the normal trash was not surveyed before being removed from the source storage room.

Health Physics staff estimated the extremity dose to the medical physicist who may have placed the Ir-192 seeds in the trash to be less than 4 millrem to the extremity. Health Physics staff further inquired of housekeeping staff who may have picked up the waste and reviewed their procedure for handling waste. Once normal waste is at the compacter, it is handled mechanically. The licensee's review indicated that the maximum possible dose received by a housekeeping worker was 1 millirem. The licensee also reviewed the monthly exposure reports for the Health Physics staff who handled the masking tape upon return from the waste consolidation site and noted that the monthly extremity dose and whole body dose of 178 millirem and 0 millirem, respectively, were typical monthly exposures.

At the time of the event, the RPO discussed this event with a Region I staff and determined that this event was not reportable.

2. **Purpose of Panel:**

Ex5

~~PREDECISIONAL INFORMATION~~
~~DO NOT DISCLOSE~~

6. **Application of Enforcement Policy**

   a. **Enforcement/Performance History:**

2000-001	Clear Inspection
1999-001	Clear Inspection

   b. **Is Credit Warranted for Identification? Explain:** No, the violation was self-identified through an event.

   c. **Is Credit Warranted for Corrective Actions? Explain:**

   Yes, the licensee revised their written procedures and retrained responsible staff on the following corrective actions:

   * Sub-strands and unused ribbons shall be recounted, identified and correlated with the initial shipment and the patient load for confirmation before the patient load is transported for patient implantation.
   * Immediate notification of Health Physics Office of any source discrepancy for appropriate guidance and recovery.
   * Survey of all accessory materials used in preparation of the patient load in a low background area prior to disposal.
   * Initiate use of a new rectangular lead shield where seeds will be visibly recounted once they are placed in the shield.
   * Upon recovery of any radioactive trash, Health Physics will carefully search and pull apart to determine source of radioactivity.
   * Early notification of all principal investigators to determine genesis of radiation source, should recovery occur prior to Health Physics Office notification of loss.

[X (redacted)] Ex5

7. **Is action being considered against individuals?** No

8. **Non-Routine Issues/Additional Information/Relevant Precedent/Lessons Learned:**

A Clear Form 591X was issued in error to the licensee on July 19, 2002.

Ex5

Note that this event was not required to be reported per 10 CFR 20.2201(a)(ii) because the source was recovered before 30 days.

Ex5

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Attachment 1

SDP/Enforcement Panel Disposition Record

Licensee: Department of the Army - Walter Reed Army Medical Center
EA No.: 02-169
Panel Date: August 20, 2002
Issue: Lost Sources

ATTENDEES:
Chair: Costello **Branch Chief** - Henderson **Enf. Reps.** - Urban, Holody
OI Rep. - N/A **RI Counsel** - Fewell **Others** - McKinley
HQ Reps - Merchant, Broaddus

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U.S. NUCLEAR REGULATORY COMMISSION **TELEPHONE CONVERSATION RECORD**	Conversation Date: 01/10/05 Time: 8:30am	
Mail Control No.: 135964	License No.: 08-01738-02	Docket No.: 03001317
Licensee/Applicant Participant(s): Department of the Army	Organization: Walter Reed Army Medical Center	Telephone No.: 202-356-0060
Person(s) Calling: Lt. Col. Mercier		
Subject: HSA and FSS Reports to release Building T-2 for		

Summary:

The licensee inquired about the status of NRC's review of the Historical Site Assessment (HSA) and the (Final Status Survey) FSS reports. I informed the licensee that the reports, including the survey data were under review. I also informed the licensee that the NRC will prepare an Environmental Assessment (EA) and a Federal Register Notice (FRN) to support authorization for release of the facility (Building T-2) for unrestricted use.

In a follow up phone call to the licensee on 01/26/05, the NRC stated that the review of the HSA and FSS reports was complete and requested the licensee to provide additional information that was required to complete the EA and FRN. The licensee provided the information promptly over the phone.

Action Required/Taken:	Action Taken: Completed review of HSA and FSS reports, prepared EA and FRN.
Prepared By: L. Kauffman	Date: 01/26/05

Document Name:E:\Filenet\ML050400573.wpd
Blank Form: G:\Reference\Blank Forms\telcon1.wpd

NUCLEAR REGULATORY COMMISSION
DOCKET NO. 030-01317
February 15, 2005

Environmental Assessment Related to an Amendment of
U.S. Nuclear Regulatory Commission Materials License No. 08-01738-02,
Issued to The Department of the Army, Walter Reed Army Medical Center

The U.S. Nuclear Regulatory Commission (NRC) is considering amending Materials License Number 08-01738-02 and authorizing the release of the licensee's facilities in Building T-2 of the Walter Reed Army Medical Center (WRAMC) in Washington, DC, for unrestricted use and has prepared an Environmental Assessment (EA) in support of this action.

SUMMARY: The NRC reviewed the results of the decommissioning of the WRAMC Building T-2 facility in Washington, D.C. WRAMC was authorized by U.S. Atomic Energy Commission (AEC), on February 18, 1959 to use radioactive materials for medical research, diagnosis, and therapy purposes at the site. In October, 2003, WRAMC ceased operations with licensed materials in Building T-2, and requested that the NRC release the facility for unrestricted use. Final decommissioning activities were performed under License 08-01738-02. Therefore, this license action is for Building T-2 in its entirety.

WRAMC has conducted surveys of the facility and determined that the facility meets the license termination criteria in 10 CFR Part 20, Subpart E. The NRC staff has evaluated the WRAMC request and the results of the surveys, and has developed an EA in accordance with the requirements of 10 CFR Part 51. The NRC has determined that a Finding of No Significant Impact (FONSI) is appropriate for the proposed action.

Introduction

WRAMC requested release for unrestricted use of the building T-2 at 6900 Georgia Avenue NW, Washington, DC, authorized for use of radioactive materials under NRC License No. 08-01738-02. The building is 50,000 square feet of general office and medical treatment space located in a mixed residential/commercial area.

License No. 08-01738-02 was issued on February 18, 1959, and amended periodically since that time. NRC-licensed activities performed at the Washington, DC site were limited to medical research. No outdoor areas were affected by the use of licensed materials.

Licensed activities in Building T-2 ceased completely on October 31, 2003, and the licensee requested release of the facility for unrestricted use. Based on the licensee's historical knowledge of the site and the conditions of the facility, the licensee determined that only routine decontamination activities, in accordance with licensee radiation safety procedures, were required. A decommissioning plan was not required to be submitted to the NRC. The licensee surveyed the facility, decontaminated or remediated areas as needed, and provided documentation that the

ML050460068

facility meets the license termination criteria specified in 10 CFR Part 20, Subpart E and does not require additional decommissioning activities to be performed. The licensee demonstrated this using the screening criteria for radioactive materials described in 65 FR 37186.

The Proposed Action

The proposed action is to amend Materials License No. 08-01738-02 and to release Building T-2 of the WRAMC at 6900 Georgia Avenue, NW, Washington, DC for unrestricted use. By letter dated October 29, 2004, WRAMC stated that no further actions are required to remediate the facility and provided survey results which demonstrate that the Building T-2, Washington, DC facility is in compliance with the radiological criteria for license termination in 10 CFR Part 20, Subpart E, "Radiological Criteria for License Termination."

Purpose and Need for the Proposed Action

The purpose of the proposed action is to amend NRC Materials License No. 08-01738-02, to release Building T-2 for unrestricted use. The licensee has requested this action to reduce their regulatory burden because they no longer intend to conduct licensed activities at this location. NRC is fulfilling its responsibilities under the Atomic Energy Act to make a timely decision on a proposed license amendment for release of facilities for unrestricted use that ensures protection of public health and safety and the environment.

Environmental Impacts of the Proposed Action

The affected environment was described in the Introduction. The licensee has completed all remediation of Building T-2. The NRC staff has reviewed the surveys performed by WRAMC which the licensee provided to demonstrate compliance with 10 CFR 20.1402, "Radiolgocical Criteria for Unrestricted Use." Based on its review, the staff has determined that the affected environment and environmental impacts associated with the release for unrestricted use of the WRAMC facilities are bounded by the impacts evaluated by the "Generic Environmental Impact Statement in Support of Rulemaking on Radiological Criteria for License Termination of NRC-Licensed Nuclear Facilities" (NUREG-1496). No outdoor areas were affected by the use of licensed materials and no non-radiological or cumulative impacts were identified.

Environmental Impacts of the Alternatives to the Proposed Action

Since the facility at the WRAMC site has already been surveyed and found acceptable for release for unrestricted use, the only alternative to the proposed action of amendment of the license and release of Building T-2 of the Washington, DC site for unrestricted use is no action. The no action alternative would result in no change to current conditions at the facility and the environmental impacts of this alternative do not differ from the impacts of the propsed action. However, maintaining Building T-2 under a license would impose an unnecessary regulatory burden and would restrict potential benefits from future uses of the site.

ML050460068

Agencies and Persons Consulted

The NRC staff has determined that the proposed action will not affect listed species or critical habitat. Therefore, no further consultation is required under Section 7 of the Endangered Species Act. Likewise, the NRC staff have determined that the proposed action is not the type of activity that has the potential to cause effects on historic properties. Therefore, no further consultation is required under Section 106 of the National Historic Preservation Act.

NRC provided a draft of its Environmental Assessment to the District of Columbia for review. On February 2, 2005, the District of Columbia responded by letter and agreed with the conclusions of the EA.

Conclusions

The NRC staff has concluded that the proposed action complies with 10 CFR Part 20, Subpart E. Based on its review, the staff has determined that the affected environment and the environmental impacts associated with the release for unrestricted use of Building T-2 are bounded by the impacts evaluated in the "Generic Environmental Impact Statement in Support of Rulemaking on Radiological Criteria for License Termination of NRC-Licensed Nuclear Facilities" (NUREG-1496). Additionally, no non-radiological or cumulative impacts were identified. On the basis of the EA, NRC has concluded that there are no significant environmental impacts and the license amendment does not warrant the preparation of an Environmental Impact Statement. Accordingly, it has been determined that a Finding of No Significant Impact is appropriate.

List of Preparers

Laurie Kauffman, Health Physicist, Division of Nuclear Materials Safety, Region I

List of References

1. NRC License No. 08-01738-02 inspection and licensing records.

2. Amendment Request for WRAMC Building T-2, 6900 Georgia Avenue NW, Washington, DC 20307-5000, dated October 29, 2004. [ADAMS Accession No. ML043220447].

3. Historical Site Assessment for WRAMC Building T-2, 6900 Georgia Avenue NW, Washington, DC 20307-5000, dated May, 7 2004. [ADAMS Accession No. ML043220460].

4. Final Status Survey for WRAMC Building T-2, 6900 Georgia Avenue NW, Washington, DC 20307-5000, dated October 14, 2004. [ADAMS Accession No. ML043220467].

5. Federal Register Notice, Volume 65, No. 114, page 37186, dated Tuesday, June 13, 2000, "Use of Screening Values to Demonstrate Compliance With The Federal Rule on Radiological Criteria for License Termination."

ML050460068

6. Title 10 Code of Federal Regulations, Part 20, Subpart E, “Radiological Criteria for License Termination.”

7. Title 10, Code of Federal Regulations, Part 51, “Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions.”

8. NUREG-1496, “Generic Environmental Impact Statement in Support of Rulemaking on Radiological Criteria for License Termination of NRC-Licensed Nuclear Facilities.”

The application for the license amendment and supporting documentation are available for inspection at NRC’s Public Electronic Reading Room at http://www.nrc.gov/reading-rm/adams.html. Any questions with respect to this action should be referred to Laurie Kauffman, Decommissioning Branch, Division of Nuclear Materials Safety, Region I, 475 Allendale Road, King of Prussia, Pennsylvania 19406, telephone (610) 337-5323, fax (610) 337-5269.

Dated at King of Prussia, Pennsylvania this 15th day of February, 2005

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

Ronald R. Bellamy, Chief
Decommissioning Branch
Division of Nuclear Materials Safety
Region I

DOCUMENT NAME: E:\Filenet\ML050460068.wpd

SISP Review Complete: RBellamy 2/15/05

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OFFICE	DNMS/RI	N	DNMS/RI	N	DNMS/RI			
NAME	Kauffman LAP		Bellamy RRB1					
DATE	2/10/05		2/15/05					

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[7590-01-P]

NUCLEAR REGULATORY COMMISSION

DOCKET NO. 03001317

NOTICE OF AVAILABILITY OF ENVIRONMENTAL ASSESSMENT AND FINDING OF NO SIGNIFICANT IMPACT FOR LICENSE AMENDMENT FOR DEPARTMENT OF THE ARMY, WALTER REED ARMY MEDICAL CENTER WASHINGTON, DC

AGENCY: Nuclear Regulatory Commission.

ACTION: Notice of Availability of Environmental Assessment and Finding of No Significant Impact.

FOR FURTHER INFORMATION CONTACT: Laurie Kauffman, Decommissioning Branch, Division of Nuclear Materials Safety, Region I, 475 Allendale Road, King of Prussia, Pennsylvania, 19406, telephone (610) 337-5323, fax (610) 337-5269; or by email: LAP@NRC.GOV .

SUPPLEMENTARY INFORMATION:

I. Introduction

The Nuclear Regulatory Commission (NRC) is considering the issuance of a license amendment to Department of the Army, Walter Reed Army Medical Center (WRAMC) for Materials License No. 08-01738-02, to authorize release of Building T-2 of the Washington, DC site for unrestricted use. NRC has prepared an Environmental Assessment (EA) in support of this action in accordance with the requirements of 10 CFR Part 51. Based on the EA, the NRC has concluded that a Finding of No Significant Impact (FONSI) is appropriate. The amendment will be issued following the publication of this Notice.

II. EA Summary

The purpose of the action is to authorize the release of the licensee's Building T-2 of the Washington, DC facility for unrestricted use. WRAMC was authorized by the U.S. Atomic Energy Commission (AEC) on February 18, 1959 to use radioactive materials for medical research, diagnosis, and therapy purposes at the site. On October 29, 2004, WRAMC requested that the NRC release the facility for unrestricted use. WRAMC has conducted surveys of the facility and provided information to the NRC to demonstrate that the site meets the license termination criteria in 10 CFR Part 20, Subpart E, for unrestricted use.

The NRC staff has prepared an EA in support of the license amendment. The facility was remediated and surveyed in support of the license amendment. The NRC staff has reviewed the information and final status survey submitted by WRAMC. Based on its review, the staff has determined that there are no additional remediation activities necessary to complete the proposed action. Therefore, the staff considered the impact of the residual radioactivity at the facility and concluded that since the residual radioactivity meets the requirements in 10 CFR Part 20, Subpart E, a Finding of No Significant Impact is appropriate.

III. Finding of No Significant Impact

The staff has prepared the EA (summarized above) in support of the license amendment to release Building T-2 in its entirety of the WRAMC facility at 6900 Georgia Avenue, NW, Washington, DC for unrestricted use. The NRC staff has evaluated WRAMC's request and the results of the surveys and has concluded that the completed action complies with the criteria in 10 CFR Part 20, Subpart E. The staff has found that the environmental impacts from the action are bounded by the impacts evaluated by NUREG-1496, Volumes 1-3, "Generic Environmental Impact Statement in Support of Rulemaking on Radiological Criteria for License Termination of NRC-Licensed Facilities" (ML042310492, ML042320379, and

ML042330385). On the basis of the EA, the NRC has concluded that the environmental impacts from the action are expected to be insignificant and has determined not to prepare an environmental impact statement for the action.

IV. Further Information

Documents related to this action, including the application for the license amendment and supporting documentation, are available electronically at the NRC's Electronic Reading Room at http://www.nrc.gov/reading-rm/adams.html. From this site, you can access the NRC's Agencywide Document Access and Management System (ADAMS), which provides text and image files of NRC's public documents. The ADAMS accession numbers for the documents related to this Notice are: Environmental Assessment (ADAMS Accession No. ML050460068); Amendment Request for WRAMC Building T-2 (ADAMS Accession No. ML043220447); Historical Site Assessment for WRAMC Building T-2 (ADAMS Accession No. ML043220460); and Final Status Survey for WRAMC Building T-2 (ADAMS Accession No. ML043220467). Persons who do not have access to ADAMS or who encounter problems in accessing the documents located in ADAMS, should contact the NRC PDR Reference staff by telephone at (800) 397-4209 or (301) 415-4737, or by email to pdr@nrc.gov.

Please note that on October 25, 2004, the NRC terminated public access to ADAMS and initiated an additional security review of publicly available documents to ensure that potentially sensitive information is removed from the ADAMS database accessible through the NRC's web site. Interested members of the public may obtain copies of the referenced documents for review and/or copying by contacting the Public Document Room pending resumption of public access to ADAMS. The NRC Public Document Room is located at NRC Headquarters in Rockville, MD, and can be contacted at (800) 397-4209, (301) 415-4737 or by email to pdr@nrc.gov .

Dated at King of Prussia, Pennsylvania this 15th day of February, 2005.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

Ronald R. Bellamy, PhD, Chief
Decommissioning Branch
Division of Nuclear Materials Safety
Region I

U.S. NUCLEAR REGULATORY COMMISSION **TELEPHONE CONVERSATION RECORD**	Conversation Date: March 4, 2005 Time: 1:30pm	
Mail Control or Report No. 135047	License No. 08-01738-02	Docket No. 03001317
Licensee/Applicant Participant(s): Mr. Burton	Organization: Walter Reed Army Medical center	Telephone No. 202-356-0058
Person(s) Calling: Jim Dwyer		
Subject: License Renewal - additional information required		
Summary: **The licensee submitted an entire new renewal package dated January 10, 2005. I called LTC Mercier and discovered he is on leave until Tuesday, March 8. I spoke with " Mr. Burton" who is the senior civilian employee in the RSO's office. In the interest of time, I discussed the deficiencies with Mr. Burton, asked him to relay the information to LTC Mercier, and told him to have LTC Mercier call me after he had a chance to consider the issues. Specifically... (1) I told the licensee we could not locate information on the Tracerlab Model RA-2A or the 3M Model 606C-CA sources that would allow us to include them on the license. Mr. Burton said they would try to locate and provide the information. (2) In several places they request sealed sources by manufacturer and model number and then add "or similar sources." I told Mr. Burton we had no mechanism for including this language on the license and would only list those sealed sources that were identified and approved. (3) I told Mr. Burton we needed the manufacturer and model number of the Pu-239 and Am-241 sealed or plated sources. (4) With regards to Items 5, 7, and 9 of the submission, I told Mr. Burton that we could not permit the RSO to give interim approvals to new users and uses, be they medical or non-medical. I told him we had programs that used subcommittees to make interim approvals between RSC meetings and other programs that used electronic mail to get RSC approval between meetings. Mr. Burton stated they used RSC subcommittees to advise the RSO. I told Mr. Burton this might be acceptable and asked that they describe the process in their response. I also told Mr. Burton that we would be able to give the RSO authority to make changes to existing users/uses. (5) In Item 6 of the submission, I told Mr. Burton we only approved of training provided by the vender or provided by individuals who received their training from the vender. We did not approve of training provided by individuals who were trained by non venders.**		
Action Required/Taken: Await response.		
Prepared By: Jim Dwyer	Date: 3/4/05	

Document Name:E:\Filenet\ML050650027.wpd
Blank Form: G:\Reference\Blank Forms\telcon1.wpd

Government of the District of Columbia
Department of Health
Environmental Health Administration
Radiation Protection Division

February 9, 2005

Ms. Laurie Kauffman, Health Physicist
U.S.N.R.C., Region 1
Division of Nuclear Materials Safety
King of Prussia, PA. 19406-1415

Dear Ms. Kauffman,

I have reviewed the Environmental Assessment (EA) Document related to the decommissioning of Building T-2 located at 6200 Georgia Ave., N.W., Washington, D.C. on the Walter Reed Army Hospital Campus. Based on the findings presented in this document, I agree with the conclusions of the EA. I support the amendment authorizing the release of Building T-2 for unrestricted use. If additional information is needed, please contact me.

Sincerely,

Mr. Gregory B. Talley, Program Manager
District of Columbia Department of Health
Environmental Health Administration
Radiation Protection Division

51 "N" St., N.E. Room 6025, Washington, D.C. 20002 (202) 535-2320

From: "Mercier, John R LTC WRAMC-Wash DC" <John.Mercier@na.amedd.army.mil>
To: "James Dwyer" <JPD1@nrc.gov>
Date: Tue, Mar 29, 2005 10:54 AM
Subject: RE: WRAMC License Renewal

Mr. Dwyer:

WRAMC hereby amends our 10Jan2005 license application as discussed in the attached *.pdf e-file.

My Regards,

LTC John Mercier, Ph.D., PE, DABR
Chief, Health Physics, WRAMC
WRAMC/NARMC RSO
U.S Army RAMT Leader
(202) 356-0060 desk
(202) 309-2911 cell
RAMT Skytel Pager: 800-759-8888 pin# 1575809
john.mercier@us.army.mil

-----Original Message-----
From: James Dwyer [mailto:JPD1@nrc.gov]
Sent: Monday, March 28, 2005 11:23 AM
To: John.mercier@us.army.mil
Cc: Sandra Gabriel
Subject: renewal

LTC Mercier:

Item #7 Attachment, Subitem #6, states for Human Use Emerging Technologies....

"The training and experience of authorized users will be evaluated using the criteria in 10 CFR 35 that most closely matches the new technology, as well as, complete vendor training specific to the new equipment and/or procedure or equivalent training provided by an authorized user previously approved for the new technology."

My point I want to make is that vendor training is acceptable and training by a previously approved authorized user is acceptable as long as the previously approved authorized user received his/her training from the vendor. Our policy is to not allow training provided by an authorized user who received his/her training from another authorized user.

With regards to the issue of interim approval by the RSO, I see this in Item #7 Attachment, Subitems #5, 7 and 9c. Please tell me about your human-use subcommittee and non-human use committee as these may suffice.

I believe we were clear, if not in agreeement, on the other issues.

jim

CC: "Sandra Gabriel" <SLG2@nrc.gov>, "Burton, David Mr WRAMC-Wash DC" <David.Burton.1@na.amedd.army.mil>

Mail Envelope Properties
(42497A27.024 : 23 : 61476)

Subject: RE: WRAMC License Renewal
Creation Date: Tue, Mar 29, 2005 10:02 AM
From: "Mercier, John R LTC WRAMC-Wash DC" <John.Mercier@na.amedd.army.mil>

Created By: John.Mercier@na.amedd.army.mil

Recipients
nrc.gov
kp1_po.KP_DO
SLG2 CC (Sandra Gabriel)
JPD1 (James Dwyer)

na.amedd.army.mil
David.Burton.1 CC (David Mr WRAMC-Wash DC

Post Office	Route
kp1_po.KP_DO	nrc.gov
	na.amedd.army.mil

Files	Size	Date & Time
MESSAGE	1582	Tuesday, March 29, 2005 10:02 AM
WRAMC NRC Lic Amend 28Mar05.PDF	1227216	
Mime.822	1682918	

Options

Expiration Date:	None
Priority:	Standard
Reply Requested:	No
Return Notification:	None
Concealed Subject:	No
Security:	Standard

From: James Dwyer
To: John.mercier@us.army.mil
Date: Mon, Mar 28, 2005 11:23 AM
Subject: renewal

LTC Mercier:

Item #7 Attachment, Subitem #6, states for Human Use Emerging Technologies...

"The training and experience of authorized users will be evaluated using the criteria in 10 CFR 35 that most closely matches the new technology, as well as, complete vendor training specific to the new equipment and/or procedure or equivalent training provided by an authorized user previously approved for the new technology."

My point I want to make is that vendor training is acceptable and training by a previously approved authorized user is acceptable as long as the previously approved authorized user received his/her training from the vendor. Our policy is to not allow training provided by an authorized user who received his/her training from another authorized user.

With regards to the issue of interim approval by the RSO, I see this in Item #7 Attachment, Subitems #5, 7 and 9c. Please tell me about your human-use subcommittee and non-human use committee as these may suffice.

I believe we were clear, if not in agreeement, on the other issues.

jim

CC: Sandra Gabriel

Mail Envelope Properties
(42482F6C.C70 : 13 : 9280)

Subject: renewal
Creation Date: Mon, Mar 28, 2005 11:23 AM
From: James Dwyer

Created By: JPD1@nrc.gov

Recipients
nrc.gov
kp1_po.KP_DO
SLG2 CC (Sandra Gabriel)

us.army.mil
John.mercier (John.mercier@us.army.mil)

Post Office	Route
kp1_po.KP_DO	nrc.gov
	us.army.mil

Files	Size	Date & Time
MESSAGE	1780	Monday, March 28, 2005 11:23 AM

Options

Expiration Date:	None
Priority:	Standard
Reply Requested:	No
Return Notification:	None
Concealed Subject:	No
Security:	Standard

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
475 ALLENDALE ROAD
KING OF PRUSSIA, PENNSYLVANIA 19406-1415

February 8, 2007

Docket No. 03001317 License No. 08-01738-02

Colonel Charles Callahan, MC
Deputy Commander for Clinical Services
Department of the Army
Walter Reed Army Medical Center
6900 Georgia Avenue, NW
Washington, DC 20307-5001

SUBJECT: INSPECTION 03001317/2007001, DEPARTMENT OF THE ARMY

Dear Colonel Callahan:

This letter forwards NRC Form 591, "Safety Inspection," indicating that no items of non-compliance were found during the above described inspection of your licensed activities. Please retain the form in your files. No acknowledgment of this letter is required. However, should you have any questions, we shall be pleased to discuss them with you.

Current NRC regulations are included on the NRC's website at www.nrc.gov; select **Nuclear Materials; Medical, Academic, and Industrial Uses of Nuclear Material;** then **Toolkit Index Page.** The current Enforcement Policy is included on the NRC's website at www.nrc.gov; select **What We Do, Enforcement,** then **Enforcement Policy.** Or you may obtain these documents by contacting the Government Printing Office (GPO) toll-free at 1-888-293-6498. The GPO is open from 7:00 a.m. to 8:00 p.m. EST, Monday through Friday (except Federal holidays).

Your cooperation with us is appreciated.

Sincerely,

Original signed by Willie J. Lee

Willie J. Lee
Health Physicist
Medical Branch
Division of Nuclear Materials Safety

Enclosure:
NRC Form 591

cc:
LTC Mark Melanson, Ph.D., Radiation Safety Officer

DOCUMENT NAME: C:\FileNet\ML070390213.wpd

SUNSI Review Complete: WLee
After declaring this document "An Official Agency Record" it **will** be released to the Public.

To receive a copy of this document, indicate in the box: "**C**" = Copy w/o attach/encl "**E**" = Copy w/ attach/encl "**N**" = No copy

OFFICE	DNMS/RI	N	DNMS/RI		DNMS/RI			
NAME	WLee							
DATE	2/8/07							

OFFICIAL RECORD COPY

NRC FORM 591M PART 1 **U.S. NUCLEAR REGULATORY COMMISSION**
(10-2003)
10 CFR 2.201

SAFETY INSPECTION REPORT AND COMPLIANCE INSPECTION

1. LICENSEE/LOCATION INSPECTED:	2. NRC/REGIONAL OFFICE
Department of the Army Walter Reed Army Medical Center Washington, DC 20307 REPORT Nos 2007-001	**U.S. Nuclear Regulatory Commission** **Region I, 475 Allendale Road** **King of Prussia, Pennsylvania 19406-1415**

3. DOCKET NUMBER(S)	4. LICENSE NUMBER(S)	5. DATE(S) OF INSPECTION
030-01317	08-01738-02	January 16-18, 2007

LICENSEE:

The inspection was an examination of the activities conducted under your license as they relate to radiation safety and to compliance with the Nuclear Regulatory Commission (NRC) rules and regulations and the conditions of your license. The inspection consisted of selective examinations of procedures and representative records, interviews with personnel, and observations by the inspector. The inspection findings are as follows:

[X] 1. Based on the inspection findings, no violations were identified.

[ ] 2. Previous violation(s) closed.

[ ] 3. The violation(s), specifically described to you by the inspector as non-cited violations, are not being cited because they were self-identified, non-repetitive, and corrective action was or is being taken, and the remaining criteria in the NRC Enforcement Policy, NUREG-1600, to exercise discretion, were satisfied.

[ ] Non-Cited Violation(s) was/were discussed involving the following requirement(s) and Corrective Action(s):

[ ] 4. During this inspection certain of your activities, as described below and/or attached, were in violation of NRC requirements and are being cited. This form is a NOTICE OF VIOLATION, which may be subject to posting in accordance with 10 CFR 19.11.

Licensee's Statement of Corrective Actions for Item 4, above.

I hereby state that, within 30 days, the actions described by me to the inspector will be taken to correct the violations identified. This statement of corrective actions is made in accordance with the requirements of 10 CFR 2.201 (corrective steps already taken, corrective steps which will be taken, date when full compliance will be achieved). I understand that no further written response to NRC will be required, unless specifically requested.

Title	Printed Name	Signature	Date
LICENSEE'S REPRESENTATIVE			
NRC INSPECTOR	Willie J. Lee	***/RA/***	**02/08/2007**

NRC FORM 591M PART 1 (Rev. by RI 07/06) C:\FileNet\ML070390217.wpd

SUNSI Review Completed By: */ RA /* Willie J. Lee [X] Public [X] Non-Sensitive

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
475 ALLENDALE ROAD
KING OF PRUSSIA, PENNSYLVANIA 19406-1415

October 15, 2007

Docket No. 03001317 License No. 08-01738-02
Control No. 138212

Thomas M. Fitzpatrick, MC
Deputy Commander for Clinical Services
Department of the Army
Walter Reed Army Medical Center
6900 Georgia Avenue NW
Washington, DC 20307-5001

SUBJECT: DEPARTMENT OF THE ARMY, REQUEST FOR ADDITIONAL INFORMATION CONCERNING FINANCIAL ASSURANCE DOCUMENTS, CONTROL NO. 138212

Dear COL Fitzpatrick:

This is in reference to audit finding associated with financial assurance for decommissioning for Nuclear Regulatory Commission License No. 08-01738-02. In order to continue our review, we need the following additional information:

1. There appears to have been no Certification of Financial Assurance submitted with you Financial Assurance documents. This document is needed as stated in NUREG-1757 Volume 3. Please submit a Certification of Financial Assurance, please follow closely the model on page A-23 of NUREG-1757, Volume 3.

2. Documentation was not included with your Statement of Intent that Major General Kiley has the authority to request and obtain decommissioning funds from the appropriate funding body when necessary. Please enclose the documentation that demonstrates he may sign the statement of intent.

3. Since it has been greater than three years since you decommissioning funding plan, please provide an updated cost estimate. Performing an update at least every three year is required by 10 CFR 30.35(e). If the updated estimate is greater than your current amount in the Statement of Intent then you will need to resubmit your financial instrument.

Current NRC regulations and guidance are included on the NRC's website at www.nrc.gov; select **Nuclear Materials; Medical, Academic, and Industrial Uses of Nuclear Material;** then **Regulations, Guidance, and Communications.** You may also obtain these documents by contacting the Government Printing Office (GPO) toll-free at 1-866-512-1800. The GPO is open from 7:00 a.m. to 8:00 p.m. EST, Monday through Friday (except Federal holidays).

We will continue our review upon receipt of this information. Please reply to my attention at the Region I Office and refer to Mail Control No. 138212. If you have any technical questions regarding this deficiency letter, please call me at (610) 337-5366.

Sincerely,

Original signed by Dennis R. Lawyer

Dennis R. Lawyer
Health Physicist
Commercial and R&D Branch
Division of Nuclear Materials Safety

cc:
COL Mark Melanson, Ph.D., Radiation Safety Officer

DOCUMENT NAME: C:\FileNet\ML072880547.wpd

SUNSI Review Complete: DLawyer
After declaring this document "An Official Agency Record" it **will** be released to the Public.

To receive a copy of this document, indicate in the box: "**C**" = Copy w/o attach/encl "**E**" = Copy w/ attach/encl "**N**" = No copy

OFFICE	DNMS/RI	N	DNMS/RI		DNMS/RI			
NAME	DLawyer ***/DRL1/***							
DATE	10/15/2007							

OFFICIAL RECORD COPY

U.S. NUCLEAR REGULATORY COMMISSION TELEPHONE CONVERSATION RECORD	Date: 12/19/2007 Time: 12:45 PM

Mail Control or Report No(s). 138212 License No(s). 08-01738-02 Docket No(s). 03001317

Name of Licensee:	Department of the Army Walter Reed Army Medical Center
Name of Participant(s):	COL Thomas M. Fitzpatrick, Radiation Safety Officer Dennis Lawyer, R1, DNMS
Telephone No.	202-356-0058
Subject: (NOTE: This will be used as the Documents Title in ADAMS)	Status of Financial Action
Summary:	I left a message asking what was the status of the financial action. I received a phone call back on 12/21/07 at 9:00 AM that the Statement of Intent had been drafted and has been sent for signature to the Commanding General.
Action Required:	Complete remaining financial documents.

Document Availability: X **Publicly Available** ___ Non-Publicly Available

X Non-Sensitive ___ Non-Sensitive Copyright ___ Sensitive ___ Sensitive Copyright

___ Immediate Release X Normal Release ___ Delay Release Date

Prepared & SUNSI Review Completed By: Dennis Lawyer ***/ RA /*** Date: 12/27/2007

U.S. NUCLEAR REGULATORY COMMISSION TELEPHONE CONVERSATION RECORD	Date: 2/26/2008 Time: 12:45 PM

Mail Control or Report No(s). 138212 License No(s). 08-01738-02 Docket No(s). 03001317

Name of Licensee:	Department of the Army Walter Reed Army Medical Center
Name of Participant(s):	COL Melanson, Radiation Safety Officer Dennis Lawyer, R1, DNMS
Telephone No.	202-356-0058
Subject: (NOTE: This will be used as the Documents Title in ADAMS)	RAI, Decommissioning Funding Plan
Summary:	I asked COL Melanson if he reviewed what we had discussed on the math error associated with the Decommissioning Funding Plan (DFP). He said that they were going to rework the plan and send in the new plan.
Action Required:	They will send in a different DFP.

Document Availability: X **Publicly Available** ___ Non-Publicly Available

X Non-Sensitive ___ Non-Sensitive Copyright ___ Sensitive ___ Sensitive Copyright

___ Immediate Release X Normal Release ___ Delay Release Date

Prepared & SUNSI Review Completed By: Dennis Lawyer ***/ RA /*** Date: 2/26/2008

From: Penny Lanzisera
Sent: Thursday, May 15, 2008 3:22 PM
To: mark.melanson@na.amedd.army.mil
Subject: Amendment Request to add camera source to Walter Reed Army Medical Center License, L.N. 08-01738-02

Department of the Army
Walter Reed Army Medical Center
L.N. 080-01738-02
D.N. 030-01317
Mail No. 142371

Dr. Melanson, to support your request dated May 6, 2008, please provide the following additional information:

1) Sealed Source and Device Registry No. for the new camera source. If this is a registration issued within the last couple of months, please submit the entire registration certificate.

2) Disposal records, and confirmation of receipt, to support removal of the eye applicator from the license.

You may fax the response to my attention to 610-337-5269. Please reference Mail Control No. 142371 in your response. Sincerely,

Penny Lanzisera
Senior HP
US NRC, Region 1

E-mail Properties

Mail Envelope Properties ()

Subject: Amendment Request to add camera source to Walter Reed Army Medical Center License, L.N. 08-01738-02
Sent Date: 05/15/2008 3:15:10 PM
Received Date: 05/15/2008 3:21:00 PM
From: Penny Lanzisera

Created By: Penny.Lanzisera@nrc.gov

Recipients:
mark.melanson@na.amedd.army.mil (mark.melanson@na.amedd.army.mil)
Tracking Status: None

Post Office:

Files Size Date & Time

MESSAGE 5076 05/15/2008

Options
Expiration Date:
Priority: olImportanceNormal
ReplyRequested: False
Return Notification: False

Sensitivity: olNormal
Recipients received:

From: Penny Lanzisera
Sent: Tuesday, May 27, 2008 11:05 AM
To: mark.melanson@na.amedd.army.mil
Subject: Amendment Request to add and remove sealed sources

Department of the Army
Walter Reed Army Medical Center
L.N. 08-01738-02
D.N. 030-01317
Mail Control 142371

Dr. Melanson, in order to complete the requested amendment, the following additional information is needed:

1) Please clarify the model number and use for the source being requested. For instance, your May 6th letter requested the addition of a Gd-153 patient attenuation source and the fax dated May 16th requested a Co-57 flood source. The model number provided for the Gd-153 source does not correspond to a source registered with the NRC. Additionally, please note that the Co-57 source may be possessed under 10 CFR 35.65 without amendment to your license.

2) Please provide a copy of the license for Environmental Management & Controls that indicates they are licensed to possess the sealed sources transferred by you. In addition, the manifest shows that 100 millicuries were transferred; however your license documents several sources with a 500 millicurie possession limit. Please clarify which sources were transferred and provide supporting documentation, such as inventory records/leak tests.

You may fax the response to my attention to 610-337-5269. Please reference Mail Control No. 142371 in your response. Sincerely,

Penny Lanzisera
Senior HP
US NRC, Region 1

E-mail Properties

Mail Envelope Properties ()

Subject: Amendment Request to add and remove sealed sources
Sent Date: 05/27/2008 10:38:40 AM
Received Date: 05/27/2008 11:04:00 AM
From: Penny Lanzisera

Created By: Penny.Lanzisera@nrc.gov

Recipients:
mark.melanson@na.amedd.army.mil (mark.melanson@na.amedd.army.mil)
Tracking Status: None

Post Office:

Files	Size	Date & Time
MESSAGE	5785	05/27/2008

Options
Expiration Date:
Priority: olImportanceNormal
ReplyRequested: False
Return Notification: False

Sensitivity: olNormal
Recipients received: