MATERIALS LICENSE

Amendment No. 46

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	
1. Department of the Army USA MEDDAC Ireland Army Community Hospital 2. Fort Knox, Kentucky 40121-5520	**In accordance with the letter dated December 3, 1996** 3. License Number 16-03657-01 **is amended in its entirety to read as follows:** 4. Expiration Date January 31, 2005 (extended) 5. Docket or Reference No. 030-01748

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 identified in 10 CFR 35.100	A. Any radiopharmaceutical identified in 10 CFR 35.100	A. As needed
B. Any byproduct material identified in 10 CFR 35.200	B. Any radiopharmaceutical identified in 10 CFR 35.200, except gases	B. As needed
C. Iodine 131	C. In capsule as iodide for preparation and administration as specified in §35.300	C. 55.5 gigabecquerels (1.5 curies)
D. Any byproduct material with a half-life less than 120 days except iodine 131	D. Any form for uses described in §35.300 initially distributed in accordance with a specific license pursuant to 10 CFR 32.72 or a specific license issued by an Agreement State pursuant to equivalent State regulations.	D. As needed, not to exceed 3.7 gigabecquerels (100 millicuries) per container
E. Any byproduct material identified in 10 CFR 31.11	E. Prepackaged kits	E. As needed
F. Gadolinium 153	F. Sealed sources registered pursuant to 10 CFR 32.210 or an equivalent Agreement State regulation.	F. Not to exceed 37 gigabecquerels (1000 millicuries) per camera unit

030028

MLOO1

MATERIALS LICENSE
SUPPLEMENTARY SHEET

License Number 16-03657-01

Docket or Reference Number 030-01748

Amendment No. 46

9. Authorized Use:

A. Medical use described in 10 CFR 35.100
B. Medical use described in 10 CFR 35.200
C. and D. Any radiopharmaceutical therapy approved in §35.300
E. In vitro studies
F. Possession and use of sealed sources contained in a compatible device (registered pursuant to 10 CFR 32.210 or an equivalent Agreement State regulation) for medical use in an ADAC "Vantage" transmission device distributed in accordance with a license issued pursuant to 10 CFR 32.74 or an equivalent Agreement State regulation. The licensee may also possess one additional source set in its shipping container incident to source exchange.
G. Non-medical use incident to performing radiation safety for authorized uses specified in Items 9.A through 9.D.

CONDITIONS

10. Location of use: Ireland Army Community Hospital, Buildings 851 and 1070, Fort Knox, Kentucky.

11. The Radiation Safety Officer for this license is Philip A. Hypes, 1LT, MS.

12. Authorized user(s) and uses:

A. Thomas E. Hall, M.D.	Medical use described in 10 CFR 35.100, §35.200, §35.300 and §31.11
B. Leonard E. Nagorski, M.D.	Medical use described in 10 CFR 35.100, §35.200, §35.300 and §31.11
C. Scott R. Partyka, M.D.	Medical use described in 10 CFR 35.100, §35.200 and §31.11
D. Jeffrey Trent Wade, M.D.	Medical use described in 10 CFR 35.100, §35.200, §35.300 and §31.11
E. Philip A. Hypes, 1LT, MS	Non-medical use specified in Subitem 9. G.

13. The licensee shall maintain records of information important to safe and effective decommissioning at the location listed in Condition 10 pursuant to the provisions of 10 CFR 30.35(g) until this license is terminated by the Commission.

14. In addition to the possession limits in Item 8, the licensee shall further restrict the possession of licensed material to quantities below the minimum specified 10 CFR 30.35 for establishing decommissioning financial assurance.

15. Sealed sources containing licensed material shall not be opened by the licensee.

MATERIALS LICENSE
SUPPLEMENTARY SHEET

License Number
16-03657-01

Docket or Reference Number
030-01748

Amendment No. 46

CONDITIONS

Continued -

16. The licensee shall not perform repairs or alterations of the transmission device(s) involving removal of shielding or access to the licensed material. Removal, replacement, and disposal of sealed sources in the transmission device(s) shall be performed by a person specifically licensed by the Commission or an Agreement State to perform such services.

17. Each transmission device shall be tested for the proper operation of the on-off mechanism and indicator, if any, at no longer than 6 month intervals or at such longer intervals as specified by the manufacturer and approved by NRC or an Agreement State.

18. 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 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. Applications dated
   1. August 10, 1994 [renewal]
   2. July 7, 1995 [add Dr. Partyka, delete Dr. Behjati]
   3. September 18, 1995 [letter dated 9/12/95, add SFC Lohr as non-medical user]
   4. October 3, 1995 [Change RSO, add Dr. Glenn]
   5. December 18, 1995 [Change authorized user for non-medical use]

B. Letters dated:
   1. June 24, 1996 [delete ventilation sys. testing; submit new QMP (to be separated from application)]
   2. July 12, 1996 [add Dr. Nagorski; delete Drs. Guiterrez and Mitchell; add Gd 153 in ADAC imaging system; change areas of use; request authorization to change internally areas of use]
   3. August 28, 1996 [add counting laboratory]
   4. **December 3, 1996 [Delete Rms. NIO-28, NIO-38, NIH-19, NIH-17, NIH-15; delete Dr. Glenn; change RSO to 1LT Hypes; Transmit Closeout Survey 5817-IACH]**

C. Reference NRC letter dated March 1, 1996 extension of expiration date per 10 CFR 30.36.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

DAVID J. COLLINS

DATE DEC 18 1996

BY David J. Collins

Region II, Division of Nuclear Materials Safety
101 Marietta Street, N.W., Suite 2900
Atlanta, Georgia 30323-0199

N:\MLICENSE\16-03657.A46

12/19/96

BETWEEN:

License Fee Management Branch, ARM
and
Regional Licensing Sections

(FOR LFMS USE)
INFORMATION FROM LTS

Program Code: 02120
Status Code: 0
Fee Category: EX 7C
Exp. Date: 20050131
Fee Comments: _____ ____
Decom Fin Assur Reqd: N

LICENSE FEE TRANSMITTAL

A. REGION

1. APPLICATION ATTACHED
   Applicant/Licensee: ARMY, DEPARTMENT OF THE
   Received Date: 961209
   Docket No: 3001748
   Control No.: 257306
   License No.: 16-03657-01
   Action Type: Amendment

2. FEE ATTACHED
   Amount: _____
   Check No.: _____

3. COMMENTS

Signed _____
Date _____

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

1. Fee Category and Amount: _____

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

3. OTHER _____
   _____

Signed _____
Date _____

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA STREET, N.W., SUITE 2900
ATLANTA, GEORGIA 30323-0199

DEC 9 1996

INFORMATION FOR NRC MATERIAL LICENSEES

Please find enclosed:
- ___ Your NRC material license
- ___√___ Amendment to your NRC material license
- _____ Amendment renewing your NRC material license
- _____ Amendment terminating your NRC material license
- _____ Notice for Radiographer Quality Assurance Approval Program

Please review the enclosed document carefully and be sure that you understand all conditions. If there are any errors or questions, please notify this office (ATTN: Ms. Diane Heim at (404) 331-4673) so that we can provide appropriate corrections and answers.

Please be advised that your license expires at the end of the day in the month and year stated in the license. Unless your license has been terminated, you must conduct your program involving byproduct materials in accordance with the conditions of your NRC license, representations made in your license application, and NRC regulations. In particular, note that you must:

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

2. Not possess and use materials authorized in Items 6, 7, and 8, on the license until:

   a. you have constructed the facilities and obtained the equipment described in the license application and supporting documentation; and

   b. you have notified the U. S. Nuclear Regulatory Commission, Region II, ATTN: Materials Licensing\Inspection Branch, in writing, that activities authorized by the license will be initiated

   c. you have submitted & certified implementation of a Quality Management Program (10 CFR 35.32) for radiotherapy, or for administering > 30 uCi of I-125 or I-131.

3. Notify NRC, in writing, within 30 days:

   a. when an authorized user, Radiation Safety Officer, or Teletherapy Physicist permanently discontinues performance of duties under the license or has a name change; or

   b. when the licensee's mailing address changes (no fee is required if the location of byproduct material remains the same).

4. In accordance with 10 CFR 30.36(b) and/or license condition, notify NRC, promptly, in writing, and request termination of the license:

   a. when you decide to terminate all activities involving materials authorized under the license; or

   b. if you decide not to complete the facility, acquire equipment, or possess and use authorized material.

(Rev. 3/96)

5. Request and obtain a license amendment before you:

   a. receive or use byproduct material for a clinical procedure permitted under Part 35 but not permitted by your license issued pursuant to this part.

   b. permit anyone, not authorized under 10 CFR 35, Subpart J, to work as an authorized user under a license for medical use of byproduct material.

   c. permit anyone, not authorized under 10 CFR 35, Subpart J, to work as a Radiation Safety Officer, Teletherapy Physicist, or Nuclear Pharmacist, under a license for medical use of byproduct material.

   d. order byproduct material in excess of the amount, or a different radionuclide or form, other than authorized on the license;

   e. add or change the areas of use or address (or addresses) of use identified in the license application or on the license; or

   f. change ownership of your organization.

6. Submit a complete renewal application with proper fee 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. Transfer of licensed materials must be consistent with 10 CFR 30.41, 40.51 or 70.42, as applicable. A license will not normally be renewed, except on a case-by-case basis, in instances where licensed material has never been possessed or used.

In addition, please note that NRC Form 313 requires the applicant, by his/her 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 certifying official rather than a consultant.

You will be periodically inspected by 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 the "General Statement of Policy and Procedures for NRC Enforcement Actions," NUREG-1600, (7/95). Since serious consequences to employees and the public can result from failure to comply with NRC requirements, prompt and vigorous enforcement action will be taken against those who do not achieve the necessary attention to detail and standard of compliance expected of licensees.

Thank you for your cooperation.

Enclosures:
1. NRC License
2. Category Marked Below for:
   [ ] New licenses: NUREG-1600 (7/95); 19; 20; 30; 40 or 70, as appropriate; 71; 170; NRC Form 3; Agreement State list; and NRC Form 313.
   [ ] New radiography licenses: Parts 34; 150.
   [ ] New medical and teletherapy licenses: Part 35.
   [ ] Amendments and renewals: NRC Form 313.

DEPARTMENT OF THE ARMY
HEADQUARTERS, U.S. ARMY MEDICAL DEPARTMENT ACTIVITY
FORT KNOX, KENTUCKY 40121-5620

REPLY TO
ATTENTION OF

MCXM-PMR (385-11m) 3 December 1996

MEMORANDUM THRU COMMANDER, Walter Reed Army Medical Center (AMC)
ATTN: HP/Health Physics Office, Washington, D.C. 20307-5001

Headquarters, U.S. Army Medical Command ATTN: MCHO-CL-W, 2050 Worth Road, Fort Sam Houston, TX 78234-6000

FOR: U.S. Nuclear Regulatory Commission, Region II, Nuclear Materials Safety Section, 101 Marietta Street, Suite 2900, Atlanta, GA 30323

SUBJECT: Additional Information - NRC License Amendment

1. The following information is provided in reference to the Memorandum from the U.S. Nuclear Regulatory Commission Region II Office dated 10 September 1996. That letter accompanied amendment number 44 to NRC License number 16-03657-01.

2. Rooms NIO-28 and NIO-38 are currently listed on the license as areas of use. They are only used for Thallium-201 procedures. NRC-regulated isotopes have never been used in these rooms. We request that these rooms be removed from the license.

3. All use of radioisotopes ceased in rooms NIH-19, NIH-17, and NIH-15 by 2 September 1996. The rooms have been surveyed as documented in the attached report. We request that these rooms be removed from our license.

4. Doctor John C. Glenn has left this facility. Please remove him from our list of authorized users.

5. Please change the Radiation Safety Officer for the license to Philip A. Hypes. The supporting documents are attached.

257306

6. The point of contact for this correspondence is 1LT Philip A. Hypes, (502)624-0609/0589.

Encl

DALLAS C. HACK
LTC, MC
C, PMS/RCC Chair

USACHPPM

U.S. Army Center for Health Promotion and Preventive Medicine

CLOSEOUT SURVEY PROJECT NO. 5817-IACH
IRELAND ARMY COMMUNITY HOSPITAL
FORT KNOX, KENTUCKY
29 SEPTEMBER 1996

Readiness Thru Health

U.S. ARMY CENTER FOR HEALTH PROMOTION AND PREVENTIVE MEDICINE

The U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM) lineage can be traced back over a half century to the Army Industrial Hygiene Laboratory which was established at the beginning of World War II under the direct jurisdiction of The Army Surgeon General. It was originally located at the Johns Hopkins School of Hygiene and Public Health with a staff of three and an annual budget not to exceed three thousand dollars. Its mission was to conduct occupational health surveys of Army-operated industrial plants, arsenals, and depots. These surveys were aimed at identifying and eliminating occupational health hazards within the Department of Defense's (DOD) industrial production base and proved to be extremely beneficial to the Nation's war effort.

Most recently, the organization has been nationally and internationally known as the U.S. Army Environmental Hygiene Agency (AEHA) and is located on the Edgewood area of Aberdeen Proving Ground, Maryland. Its mission had been expanded to support the worldwide preventive medicine programs of the Army, DOD and other Federal agencies through consultations, supportive services, investigations and training.

On 1 August 1994, the organization was officially redesignated the U.S. Army Center for Health Promotion and Preventive Medicine and is affectionately referred to as the CHPPM. As always, our mission focus is centered upon the Army Imperatives to that we are optimizing soldier effectiveness by minimizing health risk. The CHPPM's mission is to provide worldwide scientific expertise and services in the areas of:

- Clinical and field preventive medicine
- Environmental and occupational health
- Health promotion and wellness
- Epidemiology and disease surveillance
- Related laboratory services

The Center's quest has always been one of customer satisfaction, technical excellence and continuous quality improvement. Our vision is to be a world-class center of excellence for enhancing military readiness by integrating health promotion and preventive medicine into America's Army. To achieve that end, CHPPM holds everfast to its core values which are steeped in our rich heritage:

- Integrity is our foundation
- Excellence is our standard
- Customer satisfaction is our focus
- Our people are our most valuable resource
- Continuous quality improvement is our pathway

Once again, the organization stands on the threshold of even greater challenges and responsibilities. The CHPPM structure has been reengineered to include General Officer leadership in order to support the Army of the future. The professional disciplines represented at the Center have been expanded to include a wide array of medical, scientific, engineering, and administrative support personnel.

As the CHPPM moves into the next century, we are an organization fiercely proud of our history, yet equally excited about the future. The Center is destined to continue its development as a world-class organization with expanded preventive health care services provided to the Army, DOD, other Federal agencies, the Nation, and the world community.

DEPARTMENT OF THE ARMY
U.S. ARMY CENTER FOR HEALTH PROMOTION AND PREVENTIVE MEDICINE
5158 BLACKHAWK ROAD
ABERDEEN PROVING GROUND, MARYLAND 21010-5422

REPLY TO ATTENTION OF

MCHB-DC-OMH (40)

13 NOV 1996

MEMORANDUM FOR Commander, U.S. Army Medical Department Activity, ATTN: MCXM-PMR (1LT Hypes, RPO), Ireland Army Community Hospital, Fort Knox, KY 40121-5520

SUBJECT: Closeout Assist of Rooms NIH-15, 17, and 19, Ireland Army Community Hospital, Fort Knox, KY, Project No. 5817-IACH

1. References.

a. Telephone conversations between 1LT Philip Hypes, Radiation Protection Officer, IACH, Fort Knox, KY and Mr. John Collins, USACHPPM, 12 Sep 96, 16 Sep 96, 17 Sep 96, 18 Sep 96, and 29 Oct 1996.

b. Facsimile transmittals from 1LT Hypes, 12 Sep 96, 17 Sep 96, 19 Sep 96, 20 Sep 96, 11 Oct 96, 15 Oct 96, and 24 Oct 96.

c. Correspondence between 1LT Hypes and Mr. Collins, USACHPPM, 2 Oct 96, 30 Oct 96.

2. The Medical Health Physics Program at the United States Army Center for Health Promotion and Preventive Medicine has approved the closeout survey conducted to release for unrestricted use Rooms NIH-15, NIH-17, and NIH-19 at Ireland Army Community Hospital, Fort Knox, Kentucky.

3. The closeout survey was conducted in accordance with NUREG/CR 5849, Manual for Conducting Radiological Surveys in Support of License Termination, Draft Report for Comment, Jun 92.

4. The results of the closeout survey are documented in Radiation Protection Survey No. 5817-IACH, Closeout Survey of

257306

MCHB-DC-OMH
SUBJECT: Closeout Assist of Rooms HIH-15, 17, and 19, Ireland Army Community Hospital, Fort Knox, KY, Project No. 5817-IACH

Rooms NIH-15, NIH-17, and NIH-19, MEDDAC, Fort Knox, KY, 29 Sep 96.

5. Fixed and removable radiation levels identified in the closeout survey are well below the release criteria for fixed and removable contamination as specified in REG Guide 1.86.

FOR THE COMMANDER:

Debra D. Schnelle

DEBRA D. SCHNELLE
MAJ, MS
Manager, Medical Health Physics Program

Encl

CF (w/encl):
CDR, MEDCOM, ATTN: MCHO-CL-W

DEPARTMENT OF THE ARMY
U.S. ARMY CENTER FOR HEALTH PROMOTION AND PREVENTIVE MEDICINE
5158 BLACKHAWK ROAD
ABERDEEN PROVING GROUND, MARYLAND 21010-5422

REPLY TO
ATTENTION OF

EXECUTIVE SUMMARY
RADIATION SURVEY
ROOMS NIH-15, NIH-17, and NIH-19
U.S. ARMY MEDICAL DEPARTMENT ACTIVITY
FORT KNOX, KENTUCKY
2-29 September 1996

1. PURPOSE. To determine if any residual radioactivity remaining after cessation of activities is in compliance with the Nuclear Regulatory Commission and Department of the Army requirements and guidelines.

2. CONCLUSION. There are no radiological health hazards identified in rooms NIH-15, NIH-17, or NIH-19.

3. RECOMMENDATION. Recommend rooms NIH-15, NIH-17, and NIH-19 be release for unrestricted use.

RADIATION SURVEY
Rooms NIH-15, NIH-17, and NIH-19
U.S. ARMY MEDICAL DEPARTMENT ACTIVITY
FORT KNOX, KENTUCKY
2-29 September 1996

MCMX-PMR

RADIATION SURVEY
Rooms NIH-15, NIH-17, and NIH-19
U.S. ARMY MEDICAL DEPARTMENT ACTIVITY
FORT KNOX, KENTUCKY
2-29 September 1996

1. REFERENCES. See Appendix A for list of references.

2. PURPOSE. To determine if any residual radioactivity remaining after cessation of activities is in compliance with the Nuclear Regulatory Commission (NRC) and Department of the Army (DA) requirements and guidelines.

3. GENERAL.

a. The survey was performed by 1LT Philip Hypes, Nuclear Medical Science Officer, and 2LT Rey Gumboc, Nuclear Medical Science Officer, during 2-29 September 1996.

b. 1LT Hypes and 2LT Gumboc are qualified to perform radiological surveys and have training and expertise in radiological health issues.

c. 2LT Gumboc is assigned to Dwight David Eisenhower Army Medical Center. He was here on TDY to perform the beta survey.

c. List of abbreviations is found in Appendix B.

4. BACKGROUND

a. Chronology.

(1) Rooms NIH-15, NIH-17, and NIH-19 were added to NRC License 16-03657-01 with amendment 27, dated 3 July 1985. The rooms were used as a Radioimmunoassay (RIA) Laboratory by the Pathology Department. Isotopes that were previously used by the RIA Laboratory in Rooms NIH-15, NIH-17, and NIH-19 include I-125, Co-57, Tc-99m, and C-14.

(2) The RIA Laboratory was moved to rooms XIL-18 and XIL-19 on 1 October 1987. A close out radiation survey was performed on 2 October 1987 in Rooms NIH-15, NIH-17, and NIH-19. The survey revealed that there was no contamination present.

(3) After the RIA lab was moved, room NIH-19 was used as a gamma camera room by the Nuclear Medicine Department. The Radiation Protection Laboratory was located in room NIH-17, and room NIH-15 was used as general storage space by Nuclear Medicine, Radiology, and Radiation Protection.

(4) The vast majority of the patients scanned in Room NIH-19 were Tc-99m patients. Tc-99m and Tl-201 patients together account for approximately 99% of the workload in the room. The last patient to enter Rooms NIH-15, NIH-17, and NIH-19 with an isotope other than Tc-99m or Tl-201 was an individual who had undergone a diagnostic nuclear medicine procedure involving I-131. This occurred on August 22, 1996. The I-131 was not administered in either Room NIH-15, NIH-17, or NIH-19.

b. Site Condition at Time of Survey. The three rooms are connected to each other such that entry or egress to the other areas of the hospital is permitted only through Room NIH-19. Room NIH-19 is connected to both Room NIH-17 and Room NIH-15, and has a permanently affixed sink and air conditioning unit. Room NIH-19 also has a xenon ventilation system. Rooms NIH-15, NIH-17, and NIH-19 were empty and unused at the time of the survey. The total area of the rooms are approximately 50 m^2, with NIH-19 comprising approximately 28 m^2. Rooms NIH-15 and NIH-17 comprise an area of approximately 15 m^2 each.

c. Identity of Potential Contaminants/Release Guidelines. As previously reported, the significant radiological contaminants were determined to be Tc-99m and Tl-201. The release guidelines for these potential contaminants are found in Appendix F.

5. RADIATION SURVEYS AND RESULTS.

a. Instrumentation/Equipment.

Radn Prot Surv No.5817-IACH, Closeout Survey of Rooms NIH-19,-17, and -15, MEDDAC, Ft Knox, KY, 29 Sep 1996

(1) A list of instruments with all pertinent information is provided in Appendix E. Parameters, efficiencies, and minimum detectable activities (MDA) are provided with the radiological survey results in Appendix E. All survey meters were calibrated on at least an annual basis and after each maintenance and repair. Beta efficiencies were determined with a radioisotope traceable to the National Institute of Standards and Technology (NIST) which had energies similar to the energies of the isotope noted in paragraph 5.c.

(2) An efficiency factor was developed for the beta/gamma instrument to correlate the meter reading to the actual radioactivity present.

(3) A conversion factor was applied to extrapolate from the probe surface area to a normalized 100 cm^2 surface area. The equation to convert counts per minute (cpm) to disintegrations per minute (dpm)/100 cm^2 can be found in NUREG/CR-5849, page 8.2, Section 8.1.1.

(4) The efficiency value and surface area conversion factor were used to convert the final beta readings into the units used in the regulatory criteria; disintegrations per minute [dpm] per 100 cm^2.

(5) The sensitivity of the gamma survey meter was taken from NUREG/CR-5849, Table 5-6.

(6) The beta survey meter was checked for operability prior to packaging and shipping to Fort Knox, upon arrival at the survey site, before and after each morning of surveying, and before and after each afternoon of surveying. The gamma survey meter was checked for operability before and after each morning of surveying, and before and after each afternoon of surveying.

(7) Beta-Gamma. Operational instrument checks were performed with an NIST traceable Tc-99 source. All operational checks were made within 1 cm from the beta source. The same procedures and geometry were used for each check to assure

reproducibility. All beta-gamma instrumentation used during this survey can be found in Appendix E.

(8) Operational gamma meter checks were performed with a dedicated Cs-137 source before and after each meter was used. All gamma instrumentation used during this survey can be found in Appendix E.

b. Instrumentation Survey.

(1) An instrumentation survey was conducted within the girdded areas designated in each room. The entire survey area was treated as an affected area, and floor diagrams including wall grids are provided in Appendix D.

(2) The survey grid system used alphanumeric designators to pinpoint a 1 X 1 meter grid. Grid rows were designated by a number and grid columns were designated by a letter, such as "A1". Wall grids were designated by adding the wall number to the grid designator, such as "WIA1".

(3) Independent bias surveys were performed on the sink, the ceiling vent, and the roof vent of the xenon ventilation system.

(4) Field survey data packets were assembled to include background survey data, check source readings, flag values, and all grids to be surveyed. Flag values were established for each survey instrument used. Flag values were established by taking 75 percent of the NRC guideline values found in Appendix F. If any instrument reading exceeded the flag values, then a more thorough investigation of that area would be conducted to determine if the detected radiation was above guidelines listed in Appendix F.

c. Survey Results.

(1) Background Results. Background measurements were taken from an unaffected area located in hallway approximately four meters from the door to room NIH-19. This area was of similar construction, with no appreciable risk of being contaminated. All

gamma readings are recorded in units of microroentgen per hour (μR/hr). Background instrumentation readings averaged 6 μR/hr. All gamma radiation measurements were taken at approximately 1 meter from the surface.

(a) Alpha. General background for alpha contamination was not conducted due to the type of isotopes identified as possible contaminants.

(b) Beta-Gamma. Background instrumentation readings averaged 19 cpm, and after correcting for the probe area and efficiency, background was established at 850 dpm/100 cm^2.

(C) Gamma. Gamma background survey results are recorded in units of microroentgen per hour (μR/hr). Background instrumentation readings averaged 6 μR/hr. All gamma radiation measurements were taken at 1 meter from the surface.

(2) Instrumentation Survey Results.

(a) Alpha Instrumentation Results. General background for alpha contamination was not conducted due to the type of isotopes identified as possible contaminants.

(b) Beta-Gamma Instrumentation Results. An instrument survey was conducted over the entire surface. Five static readings were taken in each grid surveyed at approximately 1 cm from the surface. The instrument was held stationary for 30 seconds for each reading. The MDA averaged 1979 $dpm^{/100\ cm2}$. Flag values were also determined, but sample readings did not approach flag levels which were approximately 3 times background. Even though the readings on the ceramic tile floors were slightly higher than the readings on the walls the, readings on the ceramic floor tiles are well below the release criteria. The net beta-gamma survey results are recorded in Appendix C.

(b) Gamma Instrumentation Results. Each grid was initially scanned with the detector 2-4 cm from the surface. Recorded readings were taken at approximately 1 meter from the surface in the center of the grid. Sample readings did not

approach flag levels of 5 μR/hr above background. The radiological survey results for the gamma measurements are recorded in Appendix C.

(3) Wipe Test Surveys. Wipe test surveys were performed to determine the presence of removable contamination on surface areas. Wipes were taken in each grid square surveyed. Separate wipe samples were collected and analyzed for gamma activity and alpha/beta activity. All gross beta results were calculated using the carbon-14 counting efficiency. All gross gamma results were calculated based on the Tc-99m efficiency. Blank wipes were inserted into the wipe test packet to screen for cross contamination after every twenty-fifth sample. Each gamma result lists the activity ± 2 standard deviations due to counting uncertainty, in units of dpm per 100 cm^2.

(a) The gross alpha and gross beta MDA's for wipes 1 through 100 ranged between 1-4 dpm/wipe. The gross alpha and gross beta MDA's for wipes 101 through 195 ranged between 1-7 dpm/wipe. The gross alpha and gross beta wipes were counted with a count time of 10.0 minutes. The gross alpha and gross beta backgrounds for samples 1 through 100 were 0.00 cpm and 0.60 cpm, respectively. The gross alpha and gross beta backgrounds for samples 101 through 195 were 0.00 cpm and 1.50 cpm, respectively. Each wipe covered an area of at least 100 cm^2.

(b) To take a more conservative approach, the MDA for the gross gamma wipes was calculated on the Tc-99m efficiency of 60% as opposed to using the Tl-201 efficiency of 95%. Each wipe covered an area of at least 100 cm^2.

(4) All wipe test results and locations are included in Appendix C.

6. CONCLUSION. A review of the survey results indicated that there were no radiological health hazards identified as a result of the survey performed to release rooms NIH-15, NIH-17, and NIH-19 for unrestricted use. All areas appeared to comply with NRC regulations and guidelines.

Radn Prot Surv No.5817-IACH, Closeout Survey of Rooms NIH-19,-17, and -15, MEDDAC, Ft Knox, KY, 29 Sep 1996

7. RECOMMENDATIONS. Recommend rooms NIH-15, NIH-17, and NIH-19 be released for unrestricted use.

PHILIP A. HYPES
1LT, MS
FT. Knox MEDDAC Radiation
Protection Officer

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APPENDIX A

REFERENCES

1. NUREG/CR-5849, Manual for Conducting Radiological Surveys in Support of License Termination, Draft Report for Comment, June 1992.

2. NRC Regulatory Guide 1.86, Termination of Operating Licenses for Nuclear Reactors, June 1974.

3. Title 10, Code of Federal Regulations (CFR), 1994 (rev), Parts 30.36 and 70.38, Nuclear Regulatory Commission (NRC).

4. Federal Register, Part VI, Nuclear Regulatory Commission, 10 CFR, Part 20, et al., Standards for Protection Against Radiation, Final Rule, Tuesday, 21 May 1991.

5. Federal Register, Part III, Nuclear Regulatory Commission, 10 CFR, Part 20, et al., Radiological Criteria for Decommissioning; Proposed Rule, Monday, 22 August 1994.

6. Memorandum dated 9 December 1987, Subject: Change of Location for Radioimmunoassay Laboratory, License #16-03657-01

APPENDIX B
ABBREVIATIONS

1. Abbreviations.

ARPO	Alternate Radiation Protection Officer
Bkrd.	Background
cal	calibration
cm	centimeter
cpm	counts per minute
Cs-137	cesium-137
DA	Department of the Army
dpm	disintegrations per minute
eff	efficiency
inst	instrument
Manuf.	Manufacturer
MDA	Minimum Detectable Activity
NIST	National Institute of Standards and Technology
NRC	Nuclear Regulatory Commission
NUREG	Nuclear Regulatory Document
RPO	Radiation Protection Officer
SN	serial number
Tc-99m	technetium-99 metastable
USAEHA	U.S. Army Environmental Hygiene Agency
USACHPPM	U.S. Army Center for Health Promotion and Preventive Medicine
μR/hr	microroentgen per hour
μCi	microcurie

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APPENDIX C

Radiological Survey Results

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Room NIH 19										
Location Code	Monitoring						Wipe Test			
	Beta/Gamma					Gamma	Alpha	Beta	Gamma	
Units	dpm/100 cm^2					uR/hr	dpm/100 cm^2 +/- 2σ			
Bkg (cpm)	19					6	0.0	1	160	wipe
MDA	2380					n/a	1	4	130	No.
	rep 1	rep 2	rep 3	rep 4	rep 5		Gross alpha	Gross beta	Gross gamma	
W1, A1	-443	-312	-117	-350	-210	6	0.8 +/- 0.9	4 +/- 3	157 +/- 25	1
W1, A2	-164	1	-164	-303	116	6	0.3 +/- 0.5	1 +/- 2	176 +/- 27	2
W1, A3	-350	213	-117	-350	-24	6	0.0 +/- 0.0	0 +/- 2	144 +/- 24	3
W1, A4	-70	-70	71	347	-301	6	0.0 +/- 0.0	2 +/- 3	153 +/- 25	4
W1, A5	-70	-164	-164	116	-70	6	0.0 +/- 0.0	0 +/- 2	137 +/- 23	5
W1, A6	-164	-350	-210	-210	-257	6	0.0 +/- 0.0	4 +/- 3	138 +/- 24	6
W1, B1	-301	23	71	-444	738	6	0.0 +/- 0.0	1 +/- 3	164 +/- 26	7
W1, B2	-303	-117	71	-70	-443	6	0.0 +/- 0.0	6 +/- 4	156 +/- 25	8
W1, B3	-210	-117	-70	-164	71	6	0.0 +/- 0.0	5 +/- 3	126 +/- 22	9
W1, B4	-443	-303	-490	-24	-303	6	0.3 +/- 0.5	1 +/- 3	112 +/- 21	10
W1, B5	-24	-242	213	71	-70	6	0.0 +/- 0.0	1 +/- 2	162 +/- 25	11
W1, B6	-443	-443	-443	-257	-117	6	0.0 +/- 0.0	0 +/- 2	128 +/- 23	12
W2, A1	-70	-490	-583	-117	-258	6	0.3 +/- 0.5	0 +/- 2	164 +/- 26	13
W2, A2	-24	-303	-190	-20	-468	6	0.0 +/- 0.0	4 +/- 3	152 +/- 25	14
W2, A3	116	-24	-350	-303	391	6	0.3 +/- 0.5	4 +/- 3	142 +/- 24	15
W2, B1	-24	71	-396	-164	-117	6	0.6 +/- 0.8	11 +/- 4	151 +/- 25	16
W2, B2*	-258	-350	-862			6	0.0 +/- 0.0	3 +/- 3	191 +/- 28	17
W2, B3*	-303	71	-70			5	0.3 +/- 0.5	0 +/- 2	196 +/- 28	18
W3, A1	160	-303	-350	204	23	5	0.0 +/- 0.0	1 +/- 3	190 +/- 28	19
W3, A2	71	-24	-256	-164	-350	6	0.6 +/- 0.8	1 +/- 2	193 +/- 28	20
W3, A3	-164	-396	71	-257	-442	6	0.6 +/- 0.8	1 +/- 3	157 +/- 25	21
W3, A4	-350	-350	-397	-350	-727	5	0.0 +/- 0.0	0 +/- 2	154 +/- 25	22
W3, B1	-164	-303	-71	-350	-442	6	0.8 +/- 0.9	1 +/- 2	144 +/- 24	23
W3, B2	-70	-350	-257	-257	-325	6	0.0 +/- 0.0	1 +/- 2	134 +/- 23	24
W3, B3	-164	-164	-117	-256	302	6	0.0 +/- 0.0	1 +/- 2	155 +/- 25	25
W3, B4	71	-70	-117	-117	-257	6	0.0 +/- 0.0	-3 +/- 3	219 +/- 30	26

Room NIH-19										
Location Code	Monitoring						Wipe Test			
	Beta/Gamma					Gamma	Alpha	Beta	Gamma	
Units	dpm/100 cm^2					uR/hr	dpm/100 cm^2 +/- 2σ			
Bkg (cpm)	19					6	0.0	1	160	wipe
MDA	2380					n/a	1	7	130	No.
	rep 1	rep 2	rep 3	rep 4	rep 5		Gross alpha	Gross beta	Gross gamma	
Blank							0.0 +/- 0.0	-4 +/- 3	132 +/- 23	189
W2, C1	-257	-325	-350	-350	-164		0.0 +/- 0.0	-3 +/- 3	219 +/- 30	178
W2, C2	-443	-164	-161	-210	-443		0.0 +/- 0.0	-3 +/- 3	201 +/- 28	179
W2, C3	-208			-396			0.0 +/- 0.0	-4 +/- 3	190 +/- 28	180
W2, C4	160	-303	-350	204	23		0.5 +/- 0.8	-1 +/- 3	152 +/- 25	181
W2, C5	-24	71	-396	-164	-117		0.3 +/- 0.5	-3 +/- 3	148 +/- 24	182
SINK TRAP							1.1 +/- 1.1	-4 +/- 3	146 +/- 24	183
CV 1*	-24						0.5 +/- 0.8	-3 +/- 3	152 +/- 25	184
CV 2*	693						0.3 +/- 0.5	-2 +/- 3	186 +/- 27	185

* Denotes partial grid

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Room NIH-19										
Location Code	Monitoring						Wipe Test			
	Beta/Gamma					Gamma	Alpha	Beta	Gamma	
Units	dpm/100 cm^2					uR/hr	dpm/100 cm^2 +/- 2σ			
Bkg (cpm)	19					6	0.0	1	160	wipe
MDA	2380					n/a	1	7	130	No.
	rep 1	rep 2	rep 3	rep 4	rep 5		Gross alpha	Gross beta	Gross gamma	
Roof vent*	1004					6	0.3 +/- 0.5	-3 +/- 3	165 +/- 26	186
roof vent*	-24					6	0.3 +/- 0.5	-2 +/- 3	149 +/- 24	187
roof vent*	693					6	0.5 +/- 0.8	-2 +/- 3	173 +/- 26	188
Room NIH 19										
Location Code	Monitoring						Wipe Test			
	Beta/Gamma					Gamma	Alpha	Beta	Gamma	
Units	dpm/100 cm^2					uR/hr	dpm/100 cm^2 +/- 2σ			
Bkg (cpm)	19					6	0.0	1	160	wipe
MDA	2380					n/a	1	4	130	No.
	178	356	89	0	0		Gross alpha	Gross beta	Gross gamma	
W4, A1	-70	391	-70	-4	-4	5	0.0 +/- 0.0	0 +/- 2	137 +/- 23	27
W4, A2	-210	-306	-303	-396	-70	6	0.0 +/- 0.0	-0.3 +/- 2	153 +/- 25	28
W4, A3*	-443			116		6	0.0 +/- 0.0	0 +/- 2	213 +/- 29	29
W4, B1	-303	-210	-257	-351	-350	5	0.3 +/- 0.5	-1 +/- 2	219 +/- 30	30
W4, B2	-445	23	-583	-257	-24	6	0.3 +/- 0.5	1 +/- 3	211 +/- 29	31
W4, B3*	249			-161		6	0.3 +/- 0.5	0 +/- 2	205 +/- 29	32
W5, A1	-490	-536	160	-784	-413	6	0.3 +/- 0.5	-1 +/- 2	145 +/- 24	33
W5, A2	-350	-24	-210	213	-117	6	0.0 +/- 0.0	0 +/- 2	166 +/- 26	34
W5, A3	-70	-161	-117	-117	-257	6	0.0 +/- 0.0	0 +/- 2	173 +/- 26	35
W5, A4	-70	-303	-120	-257	-24	6	0.8 +/- 1.0	-1 +/- 2	161 +/- 25	36
W5, B1	-443	-164	-350	23	-257	6	0.6 +/- 0.8	0 +/- 2	150 +/- 24	37
W5, B2	-210	-784	-117	-445	116	6	0.0 +/- 0.0	-1 +/- 2	164 +/- 26	38
W5, B3	-70	-443	160	-117	-257	6	0.6 +/- 0.8	-1 +/- 2	167 +/- 26	39
W5, B4	-303	-350	23	-256	-534	6	0.3 +/- 0.5	1 +/- 2	155 +/- 25	40
W6, A1	-70	1	-396	-257	-536	6	0.6 +/- 0.8	0 +/- 2	137 +/- 23	41
W6, A2	-210	12	-70	-257	-70	6	0.3 +/- 0.5	0 +/- 2	136 +/- 23	42
W6, A3	-164	-350	-164	-117	-162	6	0.0 +/- 0.0	1 +/- 2	149 +/- 24	43
W6, A4	116	-303	-303	-257	-350	6	0.6 +/- 0.8	1 +/- 2	160 +/- 25	44
W6, A5	258	-257	-210	-70	-117	6	0.3 +/- 0.5	1 +/- 2	172 +/- 26	45
W6, A6*	-210			116		6	0.0 +/- 0.0	0 +/- 2	168 +/- 26	46
W6, B1	-66	-257	-350	-443	-211	6	0.3 +/- 0.5	1 +/- 2	173 +/- 26	47
W6, B2	116	-396	-70	71	-210	6	0.6 +/- 0.8	1 +/- 2	132 +/- 23	48
W6, B3	-290	-442	-443	-443	-69	6	0.3 +/- 0.5	-1 +/- 2	223 +/- 30	49
W6, B4	-164	-70	-257	-210	-117	6	0.8 +/- 1.0	0 +/- 2	198 +/- 28	50
Blank							0.3 +/- 0.5	0 +/- 3	150 +/- 24	190
W6, B5	-303	-210	-257	-490	-396	6	0.3 +/- 0.5	1 +/- 2	212 +/- 29	51
W6, B6*	-443			-117		5	0.3 +/- 0.5	0 +/- 2	231 +/- 30	52
A1	71	-303	-257	116	-210	6	0.6 +/- 0.8	-1 +/- 2	164 +/- 26	53
A2	213	71	-10	258	-24	6	0.3 +/- 0.5	0 +/- 2	166 +/- 26	54
A3	-117	-396	-24	-164	-12	6	0.8 +/- 1.0	3 +/- 3	142 +/- 24	55
A4	-350	-117	71	-88	-257	6	0.0 +/- 0.0	2 +/- 3	162 +/- 25	56
A5	-24	-164	-117	23	-210	6	0.3 +/- 0.5	0 +/- 2	128 +/- 23	57

* Denotes partial grid

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Room NIH 19										
Location Code	Monitoring						Wipe Test			
	Beta/Gamma					Gamma	Alpha	Beta	Gamma	
Units	dpm/100 cm^2					uR/hr	dpm/100 cm^2 +/- 2σ			
Bkg (cpm)	19					6	0.0	1	160	wipe No.
MDA	2380					n/a	1	4	130	
	1067	267	533	89	-267		Gross alpha	Gross beta	Gross gamma	
A3	23	489	-70	-24	-117	6	0.6 +/- 0.8	1 +/- 2	144 +/- 24	58
B1	-70	71	-164	302	302	6	0.0 +/- 0.0	0 +/- 2	172 +/- 26	59
B2	-443	302	23	-257	23	6	0.0 +/- 0.0	1 +/- 2	147 +/- 24	60
B3	-396	391	258	23	302	6	0.3 +/- 0.5	2 +/- 3	146 +/- 24	61
B4	23	213	-210	-396	-70	5	0.0 +/- 0.0	0 +/- 2	137 +/- 23	62
B5	160	160	533	258	-117	4	0.3 +/- 0.5	1 +/- 2	146 +/- 24	63
B6	302	302	-210	23	23	6	0.0 +/- 0.0	2 +/- 3	124 +/- 22	64
C1	-70	213	-42	-117	-24	6	0.0 +/- 0.0	-1 +/- 2	158 +/- 25	65
C2	391	-162	-162	-71	71	6	0.6 +/- 0.8	2 +/- 3	131 +/- 23	66
C3	-70	213	-42	-117	-24	6	0.0 +/- 0.0	1 +/- 2	152 +/- 25	67
C4	-210	-24	23	213	-117	5	0.8 +/- 1.0	2 +/- 3	153 +/- 25	68
C6*	-24		-303		-350	6	0.3 +/- 0.5	-1 +/- 2	227 +/- 30	69
D1	160	262	116	444	-257	5	0.3 +/- 0.5	0 +/- 2	215 +/- 29	70
D2	-117	213	160	116	489	6	0.0 +/- 0.0	1 +/- 2	196 +/- 28	71
D3*	-164	258	-210	0		6	0.0 +/- 0.0	0 +/- 2	186 +/- 27	72
D4	302	23	-536	347	-210	7	0.0 +/- 0.0	0 +/- 2	166 +/- 26	73
E1	213	160	-210	-536	23	5	0.3 +/- 0.5	0 +/- 2	154 +/- 25	74
E2	-164	-117	116	160	-70	6	0.8 +/- 1.0	0 +/- 2	151 +/- 25	75
Blank							0.5 +/- 0.8	-3 +/- 3	132 +/- 23	191
E3	258	-164	-210	-70	-257	6	0.6 +/- 0.8	1 +/- 3	175 +/- 26	76
E4	213	23	-536	347	-210	6	0.0 +/- 0.0	1 +/- 2	138 +/- 23	77
F1*			-676			6	1.1 +/- 1.1	-1 +/- 2	173 +/- 26	78
F2*	-562				22	6	0.6 +/- 0.8	0 +/- 2	173 +/- 26	79
F3*	-210				-210	6	0.3 +/- 0.5	0 +/- 2	139 +/- 24	80
F4*	-164				23	6	0.0 +/- 0.0	0 +/- 2	135 +/- 23	81

* Denotes partial grid

Room NIH-17										
Location Code	Monitoring						Wipe Test			
	Beta/Gamma					Gamma	Alpha	Beta	Gamma	
Units	dpm/100 cm^2					uR/hr	dpm/100 cm^2 +/- 2σ			
Bkg (cpm)	19					6	0.0	1	160	wipe No.
MDA	2380					n/a	1	4	130	
	rep 1	rep 2	rep 3	rep 4	rep 5		Gross alpha	Gross beta	Gross gamma	
W1, A1	-210	71	-210	-676	-70	6	0.0 +/- 0.0	-0.32 +/- 2	139 +/- 24	82
W1, A2	-305	-210	-115	71	23	6	0.6 +/- 0.8	2.2 +/- 3	124 +/- 22	83
W1, A3	-161	160	-117	-164	23	6	0.6 +/- 0.8	-0.69 +/- 2	123 +/- 22	84
W1, A4	-257	-303	-161	-490	-257	6	0.0 +/- 0.0	-0.32 +/- 2	171 +/- 26	85
W1, A5	23	160	-443	-68	347	7	0.0 +/- 0.0	0.6 +/- 2	158 +/- 25	86
W1, A6	-115	-536	-24	-396	-490	5	0.0 +/- 0.0	-0.32 +/- 2	159 +/- 25	87
W1, A7	-210	-257	-210	-350	-396	6	0.6 +/- 0.8	0.9 +/- 2	160 +/- 25	88
W1, B1	-70	-117	-303	-164	1	6	0.0 +/- 0.0	-0.63 +/- 2	185 +/- 27	89
W1, B2	-257	-396	-117	-70	-119	6	0.0 +/- 0.0	-0.63 +/- 2	215 +/- 29	90
W1, B3	-350	-396	-164	-443	-117	6	0.6 +/- 0.8	0.6 +/- 2	201 +/- 28	91
W1, B4	-117	-303	-350	-210	-396	6	0.0 +/- 0.0	-0.95 +/- 2	183 +/- 27	92
W1, B5	-140	71	-117	-117	-303	6	1.1 +/- 1.1	-2.3 +/- 3	156 +/- 25	93
W1, B6	-164	-70	23	23	-284	6	0.3 +/- 0.6	-3.2 +/- 3	188 +/- 27	94
W1, B7	-117	-257	71	-583	-210	6	0.3 +/- 0.6	-2.9 +/- 3	161 +/- 25	95
W2, A1	-24	-396	-70	-350	-8	6	0.0 +/- 0.0	-3.8 +/- 3	165 +/- 26	96
W2, A2	116	-257	-117	-257	-303	7	0.0 +/- 0.0	-3.1 +/- 3	144 +/- 24	97
W2, B1	-70	-583	-210	-350	116	6	0.3 +/- 0.6	-0.65 +/- 3	165 +/- 26	98
W2, B2	-117	-117	-212	71	-210	6	0.5 +/- 0.8	-2.9 +/- 3	145 +/- 24	99
W3, A1	-350	-117	-257	-527	-210	6	0.0 +/- 0.0	-4.1 +/- 3	151 +/- 25	100

Room NIH-17										
Location Code	Monitoring						Wipe Test			
	Beta/Gamma					Gamma	Alpha	Beta	Gamma	
Units	dpm/100 cm^2					uR/hr	dpm/100 cm^2 +/- 2σ			
Bkg (cpm)	19					6	0.0	1	160	wipe No.
MDA	2380					n/a	1	4	130	
	-311	133	667	-222	-44		Gross alpha	Gross beta	Gross gamma	
Blank							0.3 +/- 0.5	-3.2 +/- 3	132 +/- 23	192
W3, A2	-259	71	97	-350	-481	7	0.5 +/- 0.8	-2.9 +/- 3	135 +/- 23	101
W3, A3	-210	23	-24	-117	-350	6	0.0 +/- 0.0	-2.5 +/- 3	117 +/- 22	102
W3, A4	-210	-443	-303	71	-162	7	0.0 +/- 0.0	-2.2 +/- 3	135 +/- 23	103
W3, A5	116	-583	258	-24	-70	7	0.5 +/- 0.8	-2.3 +/- 3	137 +/- 23	104
W3, A6	-257	-303	-117	23	23	6	0.3 +/- 0.6	-2.5 +/- 3	152 +/- 25	105
W3, A7	-257	-210	116	-490	-164	6	0.3 +/- 0.6	-2.5 +/- 3	163 +/- 25	106
W3, B1	-164	160	-164	-443	23	6	0.5 +/- 0.8	-2.9 +/- 3	144 +/- 24	107
W3, B2	-396	-117	-443	-303	-24	7	0.0 +/- 0.0	-2.8 +/- 3	146 +/- 24	108
W3, B3	-396	-536	-490	-257	116	7	0.3 +/- 0.6	-1.3 +/- 3	186 +/- 27	109
W3, B4	-257	-490	-164	-350	-210	6	0.5 +/- 0.8	-2.6 +/- 3	200 +/- 28	110
W3, B5	71	-164	-117	-79	-210	7	0.5 +/- 0.8	-2.9 +/- 3	199 +/- 28	111
W3, B6	-396	-24	23	-70	-396	6	0.8 +/- 0.9	-3.9 +/- 3	202 +/- 28	112
W3, B7	-303	-303	71	-443	-210	6	0.3 +/- 0.6	-2.5 +/- 3	148 +/- 24	113
W4, A1	-70	160	-164	-70	213	6	0.5 +/- 0.8	-2.6 +/- 3	139 +/- 24	114
W4, A2	-164	-164	-350	-350	-350	6	0.3 +/- 0.6	-2.2 +/- 3	156 +/- 25	115

* Denotes partial grid

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Room NIH-17										
Location Code	Monitoring						Wipe Test			
	Beta/Gamma					Gamma	Alpha	Beta	Gamma	
Units	dpm/100 cm^2					uR/hr	dpm/100 cm^2 +/- 2σ			
Bkg (cpm)	19					6	0.0	1	160	wipe No.
MDA	2380					n/a	1	4	130	
	rep 1	rep 2	rep 3	rep 4	rep 5		Gross alpha	Gross beta	Gross gamma	
W4, B1	-164	-396	-257	-303	-164	7	0.3 +/- 0.6	-2.2 +/- 3	165 +/- 26	116
W4, B2	-210	-257	-443	-536	-303	6	0.0 +/- 0.0	-2.2 +/- 3	152 +/- 25	117
A1	302	631	1004	631	862	7	0.5 +/- 0.8	-3.8 +/- 3	147 +/- 24	118
A2	533	1236	676	720	258	6	0.0 +/- 0.0	-2.6 +/- 3	147 +/- 24	119
A3	676	533	1325	631	533	7	0.3 +/- 0.6	-1.3 +/- 3	153 +/- 25	120
A4	631	444	1280	347	489	7	0.5 +/- 0.8	-1.6 +/- 3	120 +/- 22	121
A5	720	889	764	347	720	7	0.0 +/- 0.0	-3.2 +/- 3	125 +/- 22	122
A6	1004	489	489	489	578	6	0.3 +/- 0.6	-3.1 +/- 3	113 +/- 21	123
A7	258	631	1325	631	676	5	0.0 +/- 0.0	-3.5 +/- 3	132 +/- 23	124
B1	533	1093	764	533	444	7	0.3 +/- 0.6	-2.5 +/- 3	148 +/- 24	125
Blank							0.3 +/- 0.5	2.2 +/- 3	153 +/- 25	193
B2	444	489	502	818	631	5	0.0 +/- 0.0	-1.6 +/- 3	151 +/- 25	126
B3	631	631	951	676	1422	6	0.0 +/- 0.0	-2.8 +/- 3	150 +/- 24	127
B4	720	676	1325	631	716	6	0.0 +/- 0.0	-1.6 +/- 3	146 +/- 24	128
B5	1742	907	676	-42	71	7	0.0 +/- 0.0	-3.1 +/- 3	227 +/- 30	129
B6	818	764	1236	302	818	7	0.5 +/- 0.8	-2.5 +/- 3	205 +/- 29	130
B7	818	818	578	489	258	6	0.0 +/- 0.0	-2.9 +/- 3	220 +/- 30	131

* Denotes partial grid

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Room NIH-15										
Location Code	Monitoring						Wipe Test			
	Beta/Gamma					Gamma	Alpha	Beta	Gamma	
Units	dpm/100 cm^2					uR/hr	dpm/100 cm^2 +/- 2σ			
Bkg (cpm)	19					6	0.0	1	160	wipe No.
MDA	2380					n/a	1	4	130	
	rep 1	rep 2	rep 3	rep 4	rep 5		Gross alpha	Gross beta	Gross gamma	
W1, A1	-396	302	-257	-490	-443	4	0.0 +/- 0.0	-3.5 +/- 3	215 +/- 29	132
W1, A2	-164	-257	-24	-257	-42	4	0.0 +/- 0.0	-1.9 +/- 3	160 +/- 25	133
W1, A3	-24	-307	-350	347	-348	5	0.0 +/- 0.0	-1.3 +/- 3	164 +/- 26	134
W1, A4	116	-210	-70	-117	-257	4	0.0 +/- 0.0	-2.8 +/- 3	160 +/- 25	135
W1, A5	-588	23	160	-117	-401	4	0.0 +/- 0.0	-1.3 +/- 3	144 +/- 24	136
W1, B1	444	-257	-70	258	-117	5	0.0 +/- 0.0	-3.5 +/- 3	170 +/- 26	137
W1, B2	-350	-303	-536	262	-120	6	0.5 +/- 0.8	-2.8 +/- 3	151 +/- 25	138
W1, B3	116	-257	-117	-443	-164	4	0.0 +/- 0.0	-3.5 +/- 3	157 +/- 25	139
W1, B4	-210	-303	-164	-257	258	4	0.0 +/- 0.0	-3.1 +/- 3	164 +/- 26	140
W1, B5	-303	-396	-210	-69	-186	3	0.0 +/- 0.0	-1.3 +/- 3	132 +/- 23	141
W2, A1	-70	-303	23	-164	-24	5	0.8 +/- 0.9	-2.2 +/- 3	128 +/- 23	142
W2, A2	-256	-210	-27	213	-350	3	0.3 +/- 0.6	-3.2 +/- 3	144 +/- 24	143
W2, A3	-350	116	-24	-24	-443	4	0.3 +/- 0.6	-0.97 +/- 3	144 +/- 24	144
W2, B1	-303	-70	-164	-164	-349	4	0.5 +/- 0.8	-3.2 +/- 3	156 +/- 25	145
W2, B2	213	160	-257	-257	-210	5	0.0 +/- 0.0	-2.9 +/- 3	145 +/- 24	146
W2, B3	-349	-210	-534	-350	-303	2	0.5 +/- 0.8	-3.5 +/- 3	158 +/- 25	147
W3, A2	-303	23	-210	-443	-164	4	0.0 +/- 0.0	-1.9 +/- 3	166 +/- 26	148
W3, A3	-117	-536	391	-164	-629	3	0.0 +/- 0.0	-3.1 +/- 3	193 +/- 28	149
W3, A4	-70	-164	-350	-350	-70	3	0.3 +/- 0.0	-2.8 +/- 3	205 +/- 29	150
Blank							0.0 +/- 0.0	-3.1 +/- 3	160 +/- 25	194
W3, A5	213	-117	-303	-117	-490	5	0.5 +/- 0.8	-2.5 +/- 3	190 +/- 28	151
W3, B1	-862	-862	-862	-536	-164	4	0.3 +/- 0.6	-2.3 +/- 3	190 +/- 28	152
W3, B2	-210	-257	-70	213	116	4	0.3 +/- 0.6	-3.5 +/- 3	176 +/- 27	153
W3, B3	-420	-303	-257	-443	-304	4	0.0 +/- 0.0	-2.2 +/- 3	162 +/- 25	154
W3, B4	-257	-257	-442	-350	-303	4	0.0 +/- 0.0	-0.63 +/- 3	144 +/- 24	155
W3, B5	-117	-536	-210	-303	-396	3	0.0 +/- 0.0	-1.9 +/- 3	155 +/- 25	156
W4, A1	-350	-164	-536	-210	-117	3	0.5 +/- 0.8	-1.9 +/- 3	183 +/- 27	157
W4, A2	213	-490	-396	-117	-164	3	0.0 +/- 0.0	-3.2 +/- 3	182 +/- 27	158
W4, A3	-164	303	23	-303	-257	3	0.0 +/- 0.0	-2.8 +/- 3	151 +/- 25	159
W4, B1	-442	-303	-443	-210	160	3	1.4 +/- 1.2	-3.1 +/- 3	176 +/- 27	160
W4, B2	71	-164	-256	14	-350	6	0.0 +/- 0.0	-2.6 +/- 3	136 +/- 23	161
W4, B3	-210	-350	-443	-396	-303	4	0.3 +/- 0.6	-1.3 +/- 3	148 +/- 24	162
A1	578	476	347	213	160	6	0.0 +/- 0.0	-2.2 +/- 3	139 +/- 24	163
A2	382	444	720	533	1280	3	0.3 +/- 0.6	-1.9 +/- 3	137 +/- 23	164
A3	1236	720	302	347	489	3	0.3 +/- 0.6	-1.6 +/- 3	146 +/- 24	165
A4	631	116	489	213	391	4	0.0 +/- 0.0	-3.5 +/- 3	157 +/- 25	166
A5	213	720	764	444	764	4	0.3 +/- 0.6	-2.5 +/- 3	159 +/- 25	167
B1	444	764	213	444	676	4	0.0 +/- 0.0	-3.2 +/- 3	178 +/- 27	168
B2	676	631	1093	676	578	4	0.3 +/- 0.6	-2.5 +/- 3	218 +/- 30	169
B3	1093	302	951	391	1093	5	0.0 +/- 0.0	-3.5 +/- 3	219 +/- 30	170
B4	533	1467	1093	907	444	4	0.0 +/- 0.0	-2.5 +/- 3	201 +/- 28	171
B5	631	1004	578	862	1004	5	0.0 +/- 0.0	-3.5 +/- 3	190 +/- 28	172

* Denotes partial grid

Radn Prot Surv No. 5817-IACH, Closeout Survey of Rooms NIH-19, -17, and -15, MEDDAC, Ft Knox, KY, 29 Sep 96

Room NIH-15										
Location Code	Monitoring						Wipe Test			
	Beta/Gamma					Gamma	Alpha	Beta	Gamma	
Units	dpm/100 cm^2					uR/hr	dpm/100 cm^2 +/- 2σ			
Bkg (cpm)	19					6	0.0	1	160	wipe No.
MDA	2380					n/a	1	4	130	
	rep 1	rep 2	rep 3	rep 4	rep 5		Gross alpha	Gross beta	Gross gamma	
C1	720	1004	764	1093	631	3	0.5 +/- 0.8	-0.99 +/- 3	152 +/- 25	173
C2	578	578	720	258	391	4	0.3 +/- 0.6	-2.5 +/- 3	148 +/- 24	174
C3	391	302	1004	1467	1049	5	1.1 +/- 1.1	-3.6 +/- 3	146 +/- 24	175
Blank							0.0 +/- 0.0	-2.8 +/- 3	167 +/- 26	195
C4	720	818	-210	764	382	5	0.5 +/- 0.8	-2.9 +/- 3	152 +/- 25	176
C5	720	907	533	578	444	6	0.3 +/- 0.6	-1.6 +/- 3	186 +/- 27	177

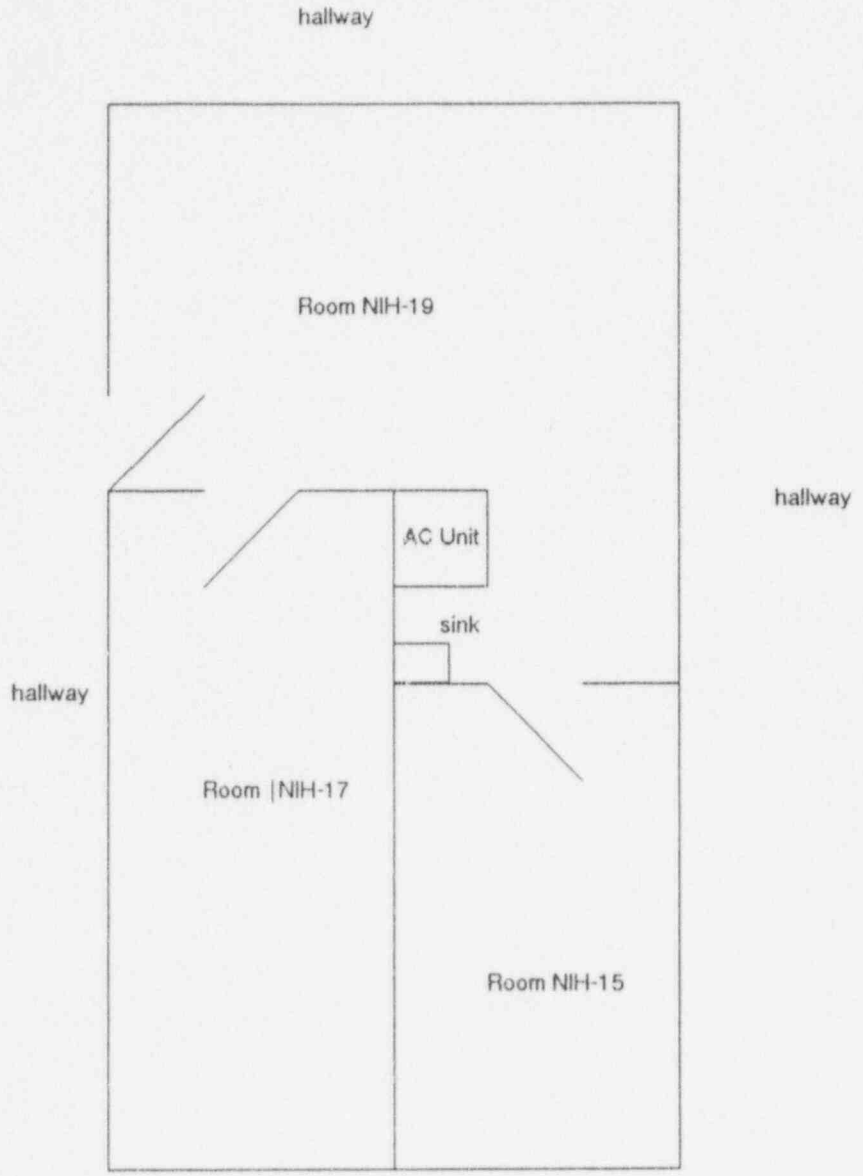
* Denotes partial grid

Radn Prot Surv No. 5817-IACH, Closeout Survey of Rooms NIH-19, -17, and -15, MEDDAC, Ft Knox, KY, 29 Sep 1996

APPENDIX D

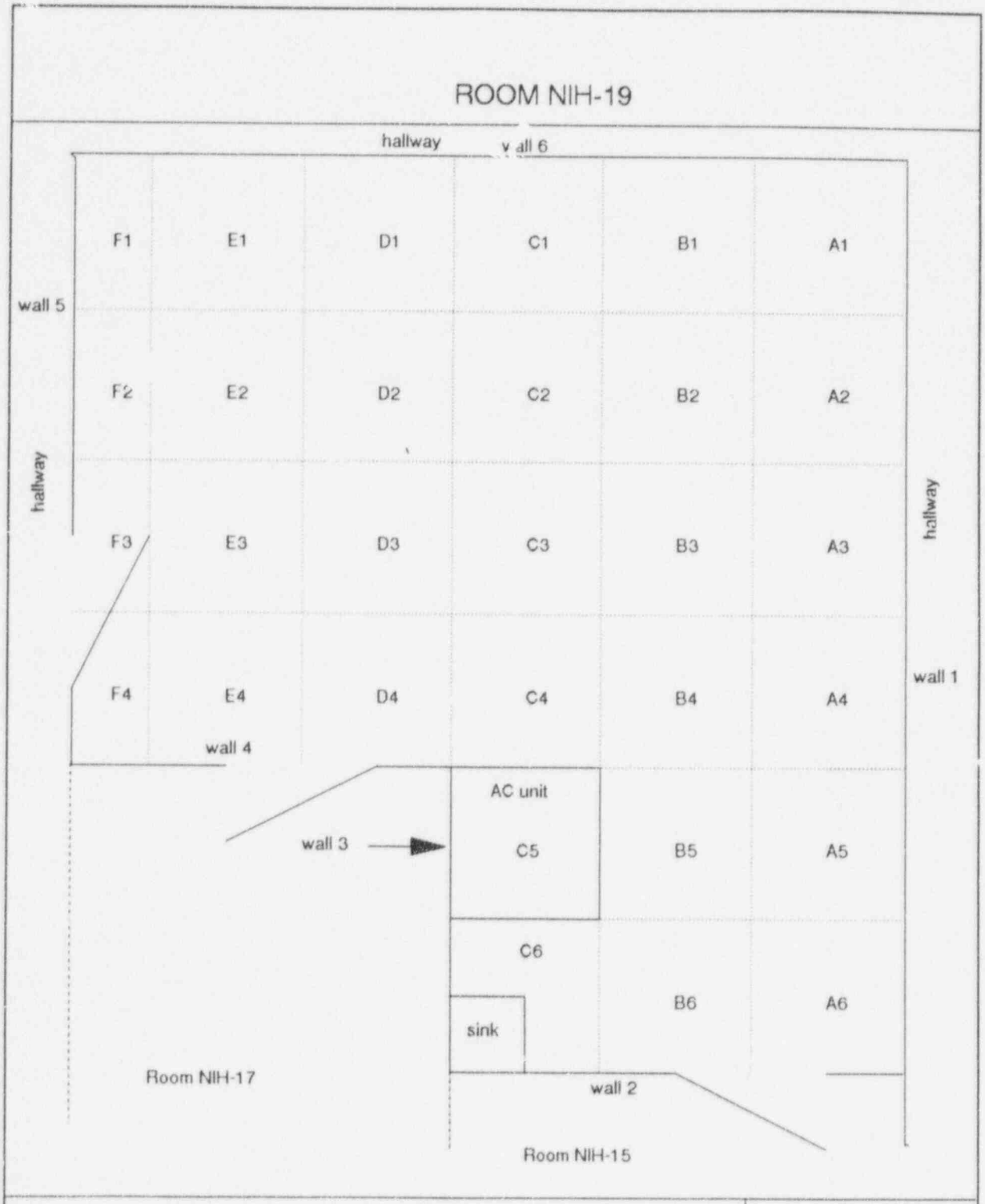
FLOOR DIAGRAMS

Rooms NIH-15, NIH-17 and NIH-19



U.S. ARMY CENTER FOR HEALTH PROMOTION
AND PREVENTIVE MEDICINE
UNITED STATES ARMY MEDICAL DEPARTMENT

DATE 17 OCT 96
DRAWN JWC
APPROVED DDS
SCALE NTS
PLATE N/A

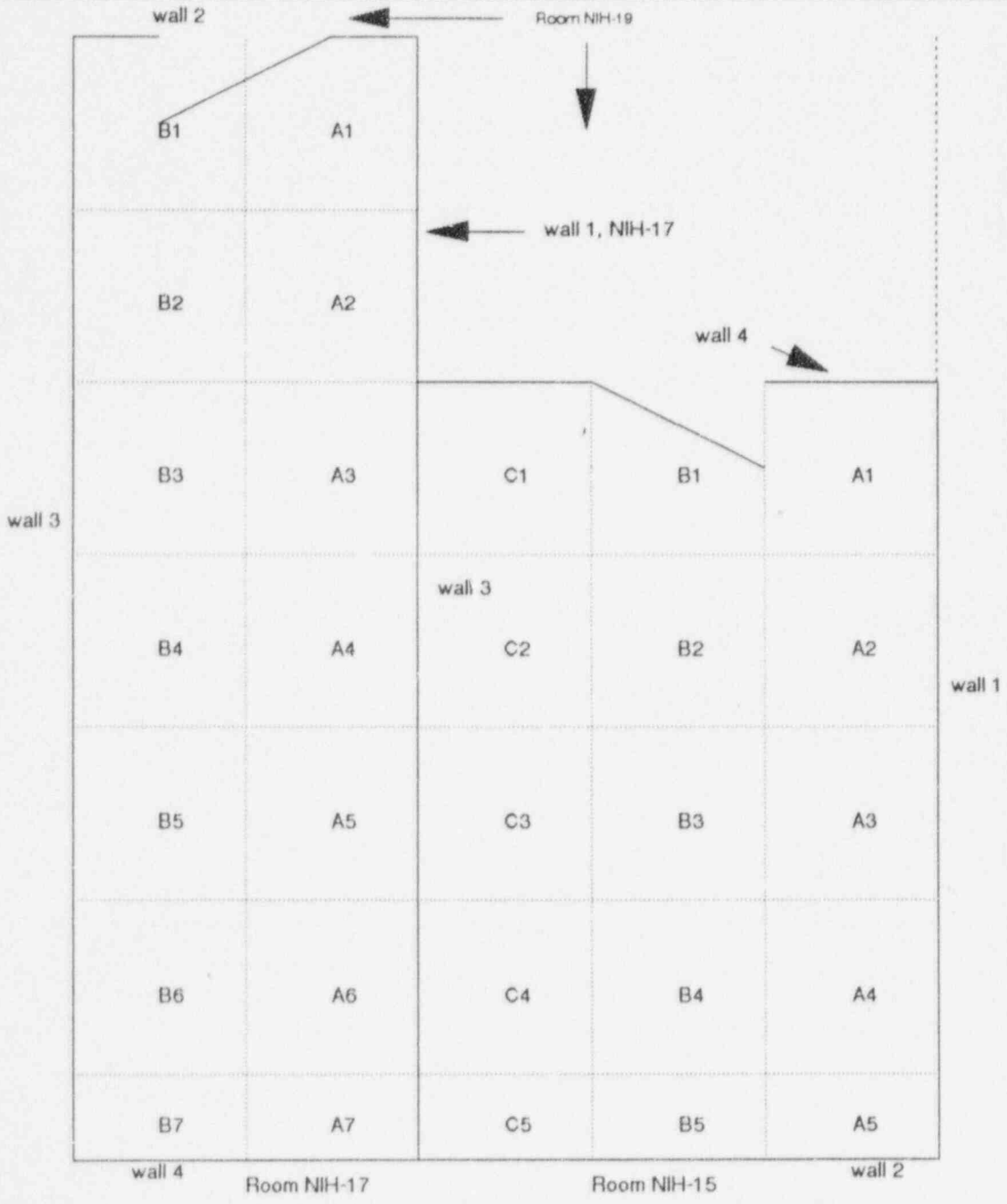


U.S. ARMY CENTER FOR HEALTH PROMOTION
AND PREVENTIVE MEDICINE
UNITED STATES ARMY MEDICAL DEPARTMENT

DATE 17 OCT 96
DRAWN JWC
APPROVED DDS
SCALE NTS
PLATE N/A

257306

Rooms NIH-15 and NIH-17



U.S. ARMY CENTER FOR HEALTH PROMOTION AND PREVENTIVE MEDICINE UNITED STATES ARMY MEDICAL DEPARTMENT	DATE 17 OCT 96 DRAWN JWC APPROVED DDS SCALE NTS PLATE N/A

Room NIH-19

Floor

	Wall 1						
A	1	2	3	4	5	6	Wall 2
B							
C							
D							Wall 3
E							Wall 4
F							← partial grids

Wall 6

Wall 5

Wall 1

	1	2	3	4	5	6
A						
B						

Wall 2

	1	2	3
A			
B			

Wall 3

	1	2	3	4
A				
B				

Wall 4

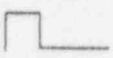
	1	2	3
A			
B			

Wall 5

	1	2	3	4
A				
B				

Wall 6

	1	2	3	4	5	6
A						
B						

Note: Wall 3 is not straight: it wraps around a fixed air handling unit, forming the following shape: 

NIH-17

Floor

	1	2	3	4	5	6	7
A							
B							

Wall 1

	1	2	3	4	5	6	7
A							
B							

Wall 2

	1	2
A		
B		

Wall 3

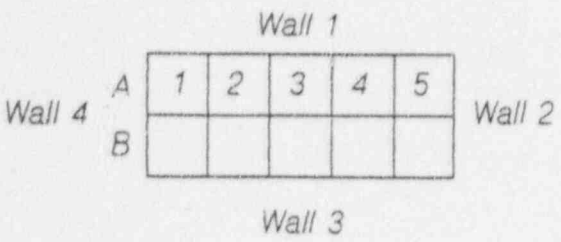
	1	2	3	4	5	6	7
A							
B							

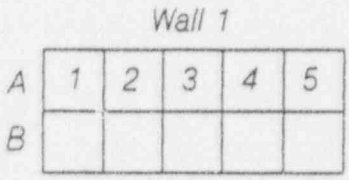
Wall 4

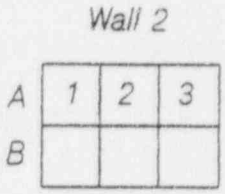
	1	2
A		
B		

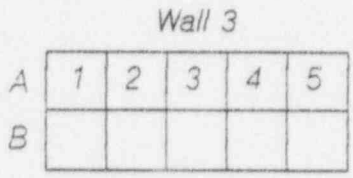
Room NIH-15

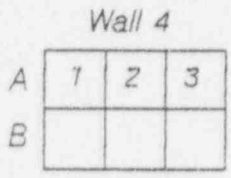
Floor











APPENDIX E

Instrumentation

Manuf.	Model Number	Serial Number	Cal. Date	Bkrd.
Bicron	Micro-Rem	B420R	1 Mar 96	4 μR/h
Bicron	μ-Analyst	B464R	1 Mar 96	6 μR/h
Bicron	μ-Analyst	B603R	1 Mar 96	6 μR/h
Eberline	ESP w/ HP-260 probe	00253	16 Jul 96	19.4 cpm

APPENDIX F

Average Limits for Removable Surface Contamination

Nuclide[a]	Average[b,c] dpm/100 cm2	Maximum[b,d] dpm/100 cm^2	Removable[b,c] dpm/100 cm^2
U-nat, U-235, and associated decay products	5,000	15,000	1,000
Transuranics, Ra-226, Ra-228, Th-230, Th-228, Pa-231, Ac-227, I-125, I-129	100	300	20
Th-nat, Th-232, Sr-90, Ra-223, Ra-224, U-234, I-126, I-131, I-133	1,000	3,000	200
Beta-gamma emitters (nuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above.	5,000	15,000	1,000

[a] Where surface contamination by both alpha and beta-gamma emitting radionuclides exists, the limits established for alpha and beta-gamma emitting nuclides should apply independently.

[b] As used in this table, dpm means the rate of emission by radioactive material as determined by correcting the cpm observed by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.

[c] Measurements of average contaminant should not be averaged over more than 1 m^2. For objects of less surface area, the average should be derived for such objects.

[d] The maximum contamination level applies to an area of not more than 100 cm2.

[e] The amount of removable radioactive material per 100 cm^2 of surface area should be determined by wiping that area with dry filter or soft absorbent paper, applying moderate pressure, and assessing the amount of radioactive material on the wipe with an appropriate instrument of known efficiency. When removable contamination on objects of less surface area is determined, the pertinent levels should be reduced proportionally. The entire surface should be wiped.

SUPPLEMENT — U.S. NUCLEAR REGULATORY COMMISSION

TRAINING AND EXPERIENCE
AUTHORIZED USER OR RADIATION SAFETY OFFICER

1. NAME OF PROPOSED AUTHORIZED USER OR RADIATION SAFETY OFFICER	2. FOR PHYSICIANS, STATE OR TERRITORY WHERE LICENSED
PHILIP A. HYPES	N/A

3. CERTIFICATION

SPECIALTY BOARD A	CATEGORY B	MONTH AND YEAR CERTIFIED C
N/A	N/A	N/A

4. TRAINING RECEIVED IN BASIC RADIOISOTOPE HANDLING TECHNIQUES

FIELD OF TRAINING A	LOCATION AND DATE(S) OF TRAINING B	TYPE AND LENGTH OF TRAINING	
		CLOCK HOURS IN LECTURE OR LABORATORY	CLOCK HOURS OF SUPERVISED ON-THE-JOB EXPERIENCE
a. RADIATION PHYSICS AND INSTRUMENTATION	See attached resume of training and experience		
b. RADIATION PROTECTION	See attached resume of training and experience		
c. MATHEMATICS PERTAINING TO THE USE AND MEASUREMENT OF RADIOACTIVITY	See attached resume of training and experience		
d. RADIATION BIOLOGY	See attached resume of training and experience		
e. RADIOPHARMACEUTICAL CHEMISTRY			

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

ISOTOPE	mCi USED AT ONE TIME	LOCATION	CLOCK HOURS	TYPE OF USE
See attached resume of training and experience		Primarily at Ireland Army Community Hospital Fort Knox, KY	See attached resume of training and experience	

257306

RESUME OF TRAINING AND EXPERIENCE

PHILIP A. HYPES
1LT, MS
RADIATION PROTECTION OFFICER

1. **General Education:**

B.S. Degree, Loyola College in Maryland, Major in Physics (Sep 1993)

2. **Training in Radiation Safety:**

a. Principles and Practices of Radiation Protection

b. Radioactivity Measurement Standardization and Monitoring Techniques

c. Mathematics and Calculations Basic to the Use and Measurement of Radioactivity

d. Biological Effects of Radiation

e. Radiochemistry

Type of Training	Course Title and Location	Duration	Date Completed
a b c d	Medical X-ray Survey Techniques Course Academy of Health Sciences Ft. Sam Houston, TX	80 hrs	May 1994
a b c d e	Operational Radiation Protection Oak Ridge, TN	40 hrs	May 1994
b c d	Radiation Bioassay Dosimetry	24 hrs	July 1994
a b c d e	ABHP Certification Examination Preparation Course Baltimore-Washington Chapter of the Health Physics Society Silver Spring, MD	60 hrs	June 1995
a b c d	Laser and Radiofrequency Hazards Course U.S. Army Center for Health Promotion and Preventive Medicine Edgewood, MD	40 hrs	April 1996

3. **Experience With Radionuclides (Nov 95 to present):**

Nuclide	Activity Range	Form	Use/Experience
Tc99m	mCi	Liquid	Monitoring, decontaminating and disposal in conjunction with medical use, gamma counter testing
Cs-137	µCi	Sealed	Leak testing, dose calibrator and survey meter testing
Co-57	mCi	Sealed	Leak testing, dose calibrator and survey meter testing, gamma meter testing, gamma counter testing, disposal
Ba-133	µCi	Sealed	Leak testing, dose calibrator testing
I-123	µCI	Liquid	Monitoring and testing in conjunction with medical use
I-125	mCi	Liquid	Monitoring and disposal in conjunction with in vitro testing
1-131	mCi	Various	Monitoring, and testing in conjunction with medical use
Tl-201	mCi	Liquid	Monitoring, decontaminating and disposal in conjunction with medical use, gamma counter testing
Ir-192	mCi	Sealed	Radiation Protection monitoring of industrial radiography procedures

4. **Principal Work Experience:**

At the U.S.Army Center for Health Promotion and Preventive Medicine (3/94-8/95): Performed Radiation Protection Program audits (for facilities with and without Nuclear Medicine), X-ray machine surveys, bioassay computation (primarily for tritium), document reviews, decommissioning surveys and survey planning.

At Ireland Army Community Hospital (11/95-present): Managed the Radiation Protection Program under the supervision of

Lieutenant Commander Jeffrey T. Wade. Performed weekly contamination surveys, decontamination, dose calibrator testing, Quality Assurance/Quality Management program monitoring, radiation training, dosimetry program management, source storage/inventory/leak testing/shipping/receiving, and record keeping.

MCXM-DOR-N 20 November 1996

MEMORANDUM FOR Radiation Control Committee

SUBJECT: Approval of Radiation Protection Officer

1. In the last year, I supervised 2LT Philip A. Hypes in the area of Radiation Protection and NRC License program management. This includes contamination survey and analysis, radioactive waste management and disposal, initial and annual training of occupationally exposed NRC workers, dose calibrator calibration, personnel dosimetry program management, radiation control committee coordination, managing a program for maintaining occupational radiation exposure ALARA, sealed source inventory/leak testing, safe use of radiopharmaceuticals, spill procedures, ordering and receiving of radioactive materials, opening of packages of radioactive materials, maintaining records of Byproduct Material Use, and radiopharmaceutical therapy procedures. All of these are requirements in which the Radiation Protection Officer should be proficient.

2. 2LT Philip A. Hypes has performed these duties with a high degree of competence. I recommend he be placed on NRC License Number 16-03657-01 as the Radiation Protection Officer.

3. Point of contact for this memorandum is LCDR Jeffrey T. Wade at Autovon 464-9285 or (502) 624-9285.

JEFFREY T. WADE
LCDR,USNR,MC
DEPARTMENT OF RADIOLOGY