

HEADQUARTERS
THIRD UNITED STATES ARMY MEDICAL LABORATORY
Fort McPherson, Georgia

17 October 1966

STANDING OPERATING PROCEDURES

Radiological Safety Program of the Third US Army Medical
Laboratory and US Army Hospital, Fort McPherson

1. GENERAL CONSIDERATIONS:

a. Radiation Hazard Control

(1) All isotopes for human use and non-human use will be restricted to the facilities of the Third US Army Medical Laboratory. US Army Hospital, Fort McPherson, presently is not equipped to handle isotopes.

(2) The officer-in-charge of the human use Radioisotope Clinic will be responsible for the observance of radiological safety precautions by all personnel working in the clinic, regardless of their individual duty assignments.

(3) Permission to handle, administer and/or assist in the administration of radioisotopes in the human use isotope clinic or any other branch of the Third US Army Medical Laboratory using isotopes may be denied or withdrawn from any person who, in the opinion of the officer-in-charge, is inadequately trained in the handling and use of radioactive material or is guilty of any breach of discipline as concerns the handling and use of material so as to incur real or possible hazard to himself or others, pending review of the circumstances by the Radioisotope Committee.

(4) The safety rules listed herein are to be observed. However, it is emphasized that mere following of the stated rules will not eliminate all possible hazards associated with the handling of radioactive materials.

(5) The Radiological Protection Officer will be responsible for overall radiation protection within the Third US Army Medical Laboratory. He will counsel the Radioisotope Committee and isotope users in this regard and has final authority in radiation safety measures.

(6) Patients from US Army Hospital, Fort McPherson, Georgia, who are to receive radioactive materials for diagnostic purposes may be treated on an inpatient basis with excreta from these individuals being exempt from all disposal regulations (10 CFR 20).

(7) Patients from US Army Hospital, Fort McPherson, will not receive therapeutic doses from this laboratory.

(8) Procurement and Storage of Radioactive Materials:

(a) The Radioisotope Committee will approve all purchase orders for radioactive materials.

(b) All isotopes for human use will be precalibrated by the manufacturer.

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(c) All isotopes will be requisitioned through Supply Section, Third US Army Medical Laboratory. Upon arrival of the isotopes at the Supply Section, the Radiological Protection Officer will be summoned to the Supply Section and will immediately make and record an inventory of the specific isotope or isotopes procured and enter them in the register.

(d) The Radiological Protection Officer will deliver all isotopes to the Medical Nuclear Science Laboratory of the Third US Army Medical Laboratory. The isotopes will be secured in lead lined vaults which are provided the Nuclear Laboratory. The keys to these vaults will be controlled by respective chiefs. Authorized users desiring isotopes from vault will coordinate with respective chiefs.

(e) All specimens and/or supplies which are marked "radioactive" when received will be placed in a designated area and not moved or touched by anyone under any circumstances. Immediately upon receipt both the Supply Officer and the Radiological Protection Officer will be notified as to the presence of the material and they will determine the manner in which the specimen will be handled. Under no circumstances will radioactive material be moved or handled without specific permission of the Radiological Protection Officer.

(f) The storage vault will be neat and segregated by type emission. Radiation level at the edge of the storage vaults will not exceed 2 mr/hr.

(g) Chiefs of Medical Nuclear Science and Veterinary Laboratorys will be responsible for the handling and disposal of radisotope-contaminated liquid and solid wastes in accordance with the recommended procedures found in Part 20, Title 10 and AR 755-380.

2. SAFETY RULES

a. In all rooms where radioactive materials are being used, the following regulations shall be in effect:

(1) There will be no eating or drinking, and no application of cosmetics.

(2) Smoking is not permitted while active material is being handled.

(3) There will be absolutely no mouth pipetting of radioactive material in the Nuclear Laboratory under any circumstances.

(4) Under no circumstances will radioactive waste be handled or disposed of by the janitorial staff.

(5) Rubber gloves will be worn at all times when radioactive material is being handled. (Except sealed, or capped containers of radioactive materials in the amounts listed under Group I of Appendix #1).

(6) All gloves, protective clothing, instruments, and glassware will be checked for radioactive contamination with a laboratory monitor after using, and, if contaminated, will be placed in the appropriate receptacle to await decontamination.

(7) All contaminated glassware, instruments, pipettes, and waste incurred in any radioisotope experiment or study will be polished and placed in an appropriate receptacle or sink by the persons performing the experiment or study.

(8) At the end of each work period the hands shall be carefully washed and tested for contamination with an instrument of suitable sensitivity.

(9) Before placing radioactive material in any container, the container will be clearly labeled with radioactive caution tape of yellow and magenta to show the particular radioactive material, the concentration in microcuries or millicuries per unit volume weight as of some particular date, and the identifying initials of the person preparing the material.

(10) Work surfaces will be covered with absorbent paper. The work in hoods will be similarly performed with absorbent paper. The work bench will be equipped with wiping papers for the prompt removal of spills.

(11) When using radioactive material, special equipment suitable for the type and level of activity being used will be used for each type of operation. This will include handling tools such as tongs, forceps, trays, and mechanical holders. When the isotopes concerned are primarily beta emitters, efficient use can be made of transparent plastic shields. Containers for liquid samples will be reinforced by an outer unbreakable container.

(12) No individual shall knowingly expose himself, or cause others to be exposed, to more than 0.02 rem in any working day.

(13) All laboratory operations with more than low level activity will be conducted in hoods.

3. RADIOACTIVE WASTE

a. The sinks in the laboratory portion of the Nuclear Laboratory will not be used for purposes of performing personal toilets, except that the non-contaminated sinks may be used for the purpose of hand washing after the removal of rubber gloves.

b. No water for drinking purposes will be obtained from this laboratory.

c. The Radiological Protection Officer is responsible to insure proper disposal of all radioactive waste within the Third US Army Medical Laboratory. Such disposal shall be accomplished under all existing regulations listed in Part 20, Title 10, NBS Handbooks, and Army Regulations.

d. Solid radioactive waste shall be placed in waterproof disposable containers and deposited in the container marked with Radiation Caution symbol and wording "Danger Radioactive Material". The radiation level outside the receptacle should not exceed 1.0 milliroentgens per hour. When full, the bag will be labeled as to content, isotope present, approximate amount in microcuries (or millicuries) and the date. These waste bags will be disposed of in accordance with AR 755-380.

e. Liquids containing short lived radioisotopes will be held in storage until the activity is essentially background. (The material will be stored in such a way that the radiation level outside the storage container will not exceed 1.0 milliroentgen per hour.)

f. All contaminated liquid waste may be disposed of in the "hot" sink provided the quantity which, if diluted by the average daily quantity of sewage (sanitary sewage flow per 24 hours is 475,000 gallons) released into the sewer by the licensee, will not result in an average concentration in excess of values specified in Appendix B, Table I, Column 2 of CFR, Title 10, Part 20; or

g. Ten times the quantity of such material specified in Appendix C of same; and

h. The quantity of any licensed or other radioactive material released in any one month, if diluted by the average monthly quantity of water released by the licensee, will not result in an average concentration exceeding the limits specified in Appendix B, Table I, Column 2 of same; and

i. The gross quantity of licensed and other radioactive material released into the sewage system by the licensee does not exceed one curie per year.

j. All liquid wastes which are held for decay must be placed in appropriate containers and marked as to isotope content, approximate amounts, and the date of collection. The radiation level outside the storage container will not exceed 1.0 milliroentgens per hour.

k. Liquid waste which cannot be disposed of through sewage system will be handled in accordance with AR 755-380.

l. All clothing that is known or suspected of being contaminated with a short half-life radioactive isotope or long half-life isotope will be placed in separate container and later destroyed or decontaminated as determined by the Radiological Protection Officer.

4. DECONTAMINATION OF GLASSWARE:

a. All glassware which is utilized directly with radioactive material shall be deemed "contaminated". The decontamination of such glassware is important not only in the interests of radiation safety but also in the unintentional invalidation of additional experimental data.

b. Contaminated glassware will be placed in a "hot" sink where it will be immediately rinsed and then undergo continuous washing. As required, the glassware will be washed in detergent and rinsed in hot water. The wash and rinse cycle will be repeated until three washings have been completed. Washed glassware may be oven or air dried.

c. Pipettes will be rinsed immediately after use and placed in a pipette soaker containing detergent. Washing shall be done by continuous washing in a pipette washer for a minimum of two hours.

d. Syringes shall be disassembled when placed in the sink. As required, syringes will be washed, dried, and monitored before return to central materiel or put into reuse. When possible the use of disposable syringes and needles is suggested. Decontaminated glassware for low energy beta radiation will be periodically spot checked by the Radiological Protection Officer.

e. All glassware which upon monitoring proves to be still contaminated will immediately be placed back into the appropriate washing cycle. If the monitoring again indicates any level of radioactivity, it will be handled accordance with AR 755-380.

5. RADIOACTIVE SPILL:

a. All radioactive material, when spilled, constitutes a hazard, either to personnel or to equipment. If a spill of radioactive material occurs in Group I (Appendix #1) turn off all fans in the immediate area and notify all other personnel in the controlled area. If the spill is liquid, drop absorbent paper on the spill and mark off the area with chalk or cord. If the spill is dry, proceed in the same manner, but convert the dry spill to liquid spill by applying wet absorbent paper over the area.

b. If a spill of radioactive material occurs in Group II (Appendix #1), hazard control is of first importance. In order to accomplish this, the person responsible for the spill will:

(1) Notify the Radiological Protection Officer or his designated representative.

(2) Be prepared to evaluate the hazard by knowing at all times which radioisotope is being handled, its chemical form, and the approximate amount being used (in millicuries or microcuries).

(3) See that all personnel in the area are notified and that they leave the immediate area of the spill without delay.

c. In the event of a spill of radioactive material in Group III (Appendix #1), the procedure listed above in "a", "b", and "c" should be carried out, plus the following:

(1) Determine the extent of personal contamination by inspection and monitoring of the involved personnel.

(2) Remove contaminated clothing.

(3) Rinse the contaminated body parts with water (making use of the sinks located in the area). Wash with soap and water, monitoring the contaminated body part after each washing.

d. Decontamination of the area of the spill will be carried out under the supervision of the Radiological Protection Officer, but only after the personnel contamination problem has been disposed of. As a general rule, the work associated with the decontamination is performed by the person responsible for the spill.

e. If ingestion or inhalation is suspected from a spill of radioactive material in Group III, AR 40-581 will be complied with, and the following will be accomplished by the Radiological Protection Officer:

(1) Evacuate the area of the original contamination.

(2) Personal decontamination will be carried out by washing external parts to prevent additional exposure or ingestion.

(3) Decontaminate the film badge (when necessary) and forward it by Air Mail Special Delivery to the Lexington Signal Depot, Lexington, Kentucky, with all data concerning the incident (i.e., isotope and its chemical form, amount ingested, date, names, etc.).

(4) Carry out all routine decontamination of clothing, work spaces, etc., which were involved.

(5) Notify the Surgeon General, Department of the Army, Washington 25, D. C., ATTN: MEDCE-OH, by telegram, of possible internal exposure. Complete DA Form 285 (Accident Report).

(6) Notify The Surgeon General, Department of the Army, Preventive Medicine Division, by telephone, of:

(a) Time and date of exposure.

(b) Millicurie strength of isotope and its chemical form.

(c) Name of individual and treatment already undertaken.

(7) A 24-hour urine sample will be collected under the direction of the Radiological Protection Officer from the person concerned. The collection shall be in a polyethylene liter bottle which will have a card attached containing the following data:

(a) Name, rank, and serial number.

(b) Date of incident.

(c) Collection dates.

(d) Isotope and chemical form.

Samples will be held until further instructions are received from the Surgeon General. If so directed, forward to:

Commanding Officer
US Army Environmental Hygiene Agency
ATTN: Director, Radiological Health Branch
Edgewood Arsenal, Maryland 21010

6. RADIATION SAFETY MONITORING:

a. Daily monitoring will be accomplished by the individual user after each operation.

b. Weekly monitoring will be accomplished by the Radiological Protection Officer. Wipe tests will be routinely conducted and when contamination is suspected. Any activity above background will be considered a contaminated area. All readings obtained, both from monitoring and wipe test, will be recorded and retained as a permanent record by the Radiological Protection Officer.

c. Any area of previously undetected contamination will be promptly removed by those persons responsible for the contamination, under the supervision of the Radiological Protection Officer.

d. Outside areas of the Third US Army Medical Laboratory will be routinely monitored.

7. PERSONNEL MONITORING:

a. Film badges are provided for persons working with radioactive material in the Third US Army Medical Laboratory. These film badges will be worn during normal working hours and are not to be removed from the laboratory. Care of the film badge will be the responsibility of the individual user.

b. Badges will be collected monthly by the X-Ray Department, US Army Hospital, Fort McPherson, Georgia. The collected badges will be sent to Lexington Signal Depot, Lexington, Kentucky, for processing and reading. The returned values will be permanently recorded in the X-Ray Department, US Army Hospital, Fort McPherson, Georgia, on DD Form 1141.

c. A thorough medical examination should be made of each individual potentially exposed to significant amounts of radiation before employment and annually thereafter.

d. US Army Environmental Hygiene Agency, Edgewood Arsenal, Maryland, will be used, if required, for monitoring of personnel for internal exposure.

8. LOGS AND RECORDS:

a. AEC Form 3 (Notice to Employees - Standard for Protection Against Radiation) must be posted in a conspicuous location.

b. History of exposure and record of exposure to ionizing radiation will be entered on Form DD 1141, in accordance with AR 40-431, and will be maintained by the Chief, Radiology, US Army Hospital, Fort McPherson, Georgia.

c. The Third US Army Medical Laboratory's SOP will be posted and the AEC licenses will be readily available.

d. Radioisotope inventory balance will be determined monthly. (Radioisotope inventory records are kept on Forms DA 8-235 and DA 8-212.)

e. Instrument logs will be maintained, indicating calibration and maintenance of the portable survey instruments.

f. Records of surveys (including wipe tests) will be kept. Wipe test of sealed sources will be under the supervision of the Radiological Protection Officer.

g. Caution signs, labels, and signals will be utilized according to CFR, Title 10, Part 20, para 20.203.

h. A report covering the period of each calendar quarter will be prepared by the Commander of the Third US Army Medical Laboratory. This report will be dispatched to the Surgeon General, ATTN: MEDPS-PO, by the fifteenth working day following the close of the report period and will contain the following information as a minimum:

(1) Copy of minutes of each Radioisotope Committee meeting, including a record of all actions taken by the Committee.

(2) Copy of the training and experience of each newly approved user of radioisotopes or any change in qualifications or certifications of previously approved user (for human use, AEC Form 313a, page 3).

(3) Radioisotope inventory, including data on quantities of radioisotopes produced, used, or disposed of, or currently in storage.

(4) List of procedures with dosage for each radioisotope used in humans during the reporting period.

(5) Information on unsolved problems, new or improved developments, or other comments of interest to, or having a bearing on, support rendered by The Surgeon General

9. OTHER ROUTINE LABORATORY PROCEDURES:

a. Neatness in the laboratory is a prime requisite for elimination of the spread of contamination. The work area should be free of equipment and materials not required for the experiment at hand, and equipment used will be decontaminated and stored in a controlled location after use.

b. Floors in the Nuclear Laboratory should be cleaned daily by wet mopping. Brooms and mops will not be transferred to other areas unless they are free from radioactive contamination.

c. Table tops, equipment, or any surface within the Nuclear Laboratory will be kept clean. Under no circumstances will there be an accumulation of dust and/or possible contamination.

d. Floors will be waxed and buffed on a monthly basis.

e. The survey meters will be calibrated at least every six months and after every maintenance procedure or battery change.

f. Batteries in the survey meters will be checked monthly, and changed when necessary.

10. USE OF ELECTRON CAPTURE ACCESSORIES AND/OR ARGON BETA IONIZATION: The following techniques, procedures and personnel protection practices will be followed in conjunction with the possession and use of gas chromatographs utilizing any radioisotope or its emissions to provide analytical chemistry data. This supplements the health physics program.

a. Sources. The sources will be treated as controlled items as per AR 40-61 and Title 10, CFR.

(1) The sources will be listed on the monthly isotope inventory report by the designated user and submitted to the Radiological Protection Officer (RPO) for incorporation in the monthly inventory.

(2) Removal, replacement, or handling of the sources or their containers will be under the supervision of the user designated for the chromatograph or in his absence the RPO.

(3) Whatever personnel have reason to believe or suspect that high-temperature-limit devices have malfunctioned or otherwise allowed sources to be heated above their maximum operating temperature, the laboratory will be cleared and the RPO or his alternate will be informed immediately.

(4) Inoperability of the high-temperature-limit device will be cause for "deadlining" the gas chromatograph.

(5) Sources (auxiliary, removed for repair, received but not installed, etc.) will be kept in sealed containers, which are appropriately marked, when not physically installed in a gas chromatograph.

(6) When sources are removed from the machine, care will be taken to avoid damage and storage will be in sealed containers in one of the user's fume hoods. The container will be labeled to identify source and activity.

(7) Personnel will not attempt to repair, dismantle, or otherwise change the integrity of a radioisotope source detector intended for use in or with a gas chromatograph.

b. Leak Testing

(1) Sources requiring leak testing will be tested by personnel appointed by the Radioisotope Committee.

(2) Units will be located in areas subject to corrosive vapors, intense vibrations, or uncontrolled temperature.

(3) Exhaust gases will be vented by suitable means to exterior of buildings rather than working environment.

e. Samples. Due to the delicate nature of the sources, personnel will exercise due caution when processing samples of corrosive materials within the gas chromatographs. Sources will be carefully checked for damage when samples which would react with the sources or encapsulating materials are used.

f. Personnel and Area Monitoring

(1) Due to the nature of the radioisotopes used in electron capture and/or Argon Beta ionization techniques, film badges provide monitoring for personnel and are required.

(2) As noted in the present health physics program, weekly monitoring of the using laboratories will be conducted, utilizing wipe test procedures.

(3) In the event of a confirmed or suspected release of radioactive material, urine specimens will be obtained from personnel who have worked in the area for a bioassay analysis.

FOR THE COMMANDER:



WILLIAM J. TOWNSEND
1Lt, MSC
Adjutant

1 Incl
Safe Handling Level for
Radioisotopes

SAFETY HANDLING LEVEL FOR RADIOISOTOPES

GROUP I ** No special handling required in normal laboratory procedures		GROUP II ** Not dangerous, but unnecessary exposure is to be avoided		GROUP III ** Dangerous, should be handled with utmost caution	
Isotope	Maximum Amount	Isotope	Maximum Amount	Isotope	Amount
Au ¹⁸⁹	0.025mc	Au ¹⁸⁹	1.000mc	Au ¹⁸⁹	Over 1.000mc
Br ⁸²	0.300mc	Br ⁸²	5.000mc	Br ⁸²	" 5.000mc
Be ⁷	0.005mc	Be ⁷	0.100mc	Be ⁷	" 0.100mc
*C ¹⁴ Urea	0.050mc	C ¹⁴ Urea	1.000mc	C ¹⁴ Urea	" 1.000mc
*C ¹⁴ all other	0.025mc	C ¹⁴ All other	1.000mc	C ¹⁴ other	" 1.000mc
Ca ⁴⁵	0.005mc	Ca ⁴⁵	0.100mc	Ca ⁴⁵	" 0.100mc
Co ⁶⁰	0.025mc	Co ⁶⁰	1.000mc	Co ⁶⁰	" 1.000mc
Cr ⁵¹	0.025mc	Cr ⁵¹	1.000mc	Cr ⁵¹	" 1.000mc
Fe ⁵⁵	0.005mc	Fe ⁵⁵	0.100mc	Fe ⁵⁵	" 0.100mc
Fe ⁵⁹	0.025mc	Fe ⁵⁹	1.000mc	Fe ⁵⁹	" 1.000mc
*H ³ Water	0.025mc	H ³ Water	10.000mc	H ³ Water	" 10.000mc
*H ³ Thymidine	0.001mc	H ³ Thymidine	0.050mc	H ³ Thymidine	" 0.050mc
*H ³ all other	0.005mc	H ³ all other	0.100mc	H ³ other	" 0.100mc
I ¹³¹	0.025mc	I ¹³¹	1.000mc	I ¹³¹	" 1.000mc
Na ²²	0.025mc	Na ²²	1.000mc	Na ²²	" 1.000mc
P ³²	0.025mc	P ³²	1.000mc	P ³²	" 1.000mc
S ³⁵	0.025mc	S ³⁵	1.000mc	S ³⁵	" 1.000mc
Se ⁷⁵	0.025mc	Se ⁷⁵	1.000	Se ⁷⁵	" 1.000mc
Sr ⁸⁵	0.025mc	Sr ⁸⁵	1.000mc	Sr ⁸⁵	" 1.000mc
Sr ⁸⁹	0.025mc	Sr ⁸⁹	1.000mc	Sr ⁸⁹	" 1.000mc
Sr ⁹⁰	0.005mc	Sr ⁹⁰	0.100mc	Sr ⁹⁰	" 0.100mc
Zn ⁶⁵	0.005mc	Zn ⁶⁵	0.100mc	Zn ⁶⁵	" 0.100mc

* Group classification dependent upon chemical form.

** It must be remembered that these limits are by no means fixed and that any undue exposure is undesirable. Therefore, when working with the above radioisotopes, the physical characteristics, half-life, the internal and external hazard, and the radiative properties of the radioactive material must be considered.