

# Gettysburg College

GETTYSBURG  
PENNSYLVANIA

0726

February 9, 1960

Mr. Robert E. Brinkman  
Isotopes Branch  
Division of Licensing and Regulation  
U. S. Atomic Energy Commission  
Washington 25, D. C.

Dear Mr. Brinkman:

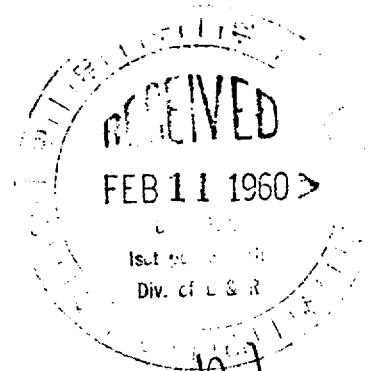
Enclosed you will please find the information pertaining to the type of use of Barium 131, Chromium 51 and Cobalt 58 which you requested in your letter of January 27, 1960. Also, I have written a set of instructions along the lines which you suggested. If these instructions meet with your approval I shall have them mimeographed for distribution to students.

Very shortly construction will begin on our new physics building. In the nuclear laboratory we have requested a hood and a vault for storing radioactive material. I do not plan for the students to do any source preparation until we are in the new building. Until then I would plan to perform the necessary preparation of sources myself. Beta ray sources would be covered so that the likelihood of students becoming involved with contamination would be small for the present.

Yours truly,

J. Richard Haskins  
Assistant Professor of Physics

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February 9, 1960

Additional information for Item 9 of form AEC - 313 submitted from Gettysburg College January 15, 1960:

All of these isotopes were purchased from the Radioisotopes division of the Oak Ridge National Laboratory. The  $Ba^{131}$  was obtained in all but one instance as  $BaCl_2$  in HCl solution. An ether-HCl solution was used to precipitate  $BaCl_2$ . The  $BaCl_2$  was then dissolved in water. Some sources were prepared by evaporating a drop to dryness on a thin collodion film. Other sources were prepared by placing the liquid solution in a small test tube. In one case barium metal was irradiated in the Oak Ridge highest flux reactor. The radioactive metal was placed in a test tube under paraffin oil and was used as a source for gamma-gamma angular correlation experiments. The  $Cr^{51}$  was received as  $CrCl_3$  in HCl solution. Sources were made by evaporating to dryness a drop on a thin collodion film mounted on a plastic ring. The conversion electrons of the 0.32 Mev gamma ray were used for calibration purposes with an anthracene scintillation spectrometer. The  $Co^{58}$  was received as  $CoCl_2$  in HCl solution. It was used as received in a small test tube. The 0.51 Mev annihilation radiation was used for calibration purposes in gamma-gamma angular correlation experiments.

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**NUCLEAR LABORATORY ADMINISTRATIVE AND OPERATING  
PROCEDURES FOR THE HANDLING OF RADIOISOTOPES**

**1. Good Housekeeping**

Good housekeeping practices should be observed. Store all items not being used in their proper storage place. Clear table tops of everything except the necessary instruments and notebooks for taking and recording data.

Source preparation is to be carried out in the hood. When completed the working area is to be cleaned up. Any contaminated area or glassware should be clearly marked as contaminated and as soon as possible decontaminated. Radioactive tape stickers and signs are available for marking. Source preparation and decontamination are to be carried out under the supervision of the instructor.

Before beginning work in an area where the possibility of contamination exists monitor the area with one of the survey meters. After completing work in this area again monitor it. If contamination is found mark the area as contaminated, report this fact to the person in charge and then clean up the area under the instructor's supervision.

Smoking and eating will not be permitted in the laboratory.

**2. Protective Apparel**

Whenever there is a possibility of a spill such that clothing could be contaminated, it will be necessary to wear protective clothing. In particular when a source is to be prepared by evaporating to dryness from a liquid source, by electrolysis, by vapor deposition or by any other method the following clothing should be worn: coveralls, rubber gloves, and an extra pair of shoes. This clothing is kept in the laboratory. This clothing is also to be worn when handling any open source (source which is not covered by a protective film or is not enclosed in a container).

**3. Source Handling Equipment**

In general the sources to be handled in this laboratory will not be of sufficient activity to require remote handling equipment. Before handling any of the sources, however, the student should make a calculation of the dose he would expect to receive during the time he would be handling the source material. This calculation is to be submitted to the instructor before the student handles the source. If it then seems desirable to handle the source remotely, two sets of tongs are available for this purpose. The student should gain facility in handling various non-radioactive objects and carry out a few dry-runs before proceeding to handle the radioactive material. Under no circumstances should the neutron source be handled, except remotely and with the supervision of the instructor.

**4. Emergency Procedures**

If a spill of radioactivity occurs the area <sup>is</sup> to be immediately marked. Report the accident to the instructor and take necessary steps for cleaning up under the instructor's supervision.

If there is reason to believe that anyone has received an overdose of radiation this will be reported to the infirmary and/or the local hospital for the purpose of having a blood-count made.

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## 5. Storage

All radioactive materials when not in use are to be stored in the area provided in the vault. This vault is to be locked at all times except when removing or replacing source material. Keys to the vault should be in the possession only of the instructor with the exception of one key to be kept in the main office to be used only in an emergency.

## 6. Disposal

All radioactive waste will be disposed of in containers provided especially for this purpose. The instructor will then be responsible for further disposal in accordance with paragraphs 20.301, 20.302, 20.303, 20.304 and 20.305 of Title 10, Code of Federal Regulations, Chapter 1, part 20. These paragraphs should be read by all students.

## 7. Area Restriction

Only those persons who have received permission from the person in charge of the laboratory are to be allowed inside the laboratory. The laboratory should be kept locked when not in use. Radioactivity warning signs should be conspicuously posted so that all persons working in the laboratory are conscious of the areas of activity and so that others will be warned against entering the laboratory.

## 8. Records

All radioactive material must be accounted for. Records of the use and disposal of the radioactive material are to be kept. The student is to keep a record which is to include the amount of radioactive material used in source preparation, the date of preparation and the place where the source is finally stored. The source should be labeled. The label should give the radioisotope, amount of activity and the date prepared. A similar record should be kept of any radioactive material disposed of. The disposed material should also be labeled. A copy of these records should be given to the instructor.

## 9. Additional General Procedures

Wear pocket chambers during every laboratory period and keep a record of the readings. Avoid jarring the chambers. Meter all radioactive samples and determine the safe working distance or shielding procedure before beginning work with them. Avoid handling samples in such a way that any radioactive material can be transferred to the hands or other parts of the body.

Plan your work carefully to minimize any danger of spilling radioactive material. When preparing sources work over absorbent paper so that if slight losses occur they will be caught by the paper which is disposable. Do not use uncovered samples if it is avoidable. Monitor hands, face, clothing and shoes before and after every laboratory period.

## 10. The following references include material on the safe-handling of radioisotopes:

- (1) Bleuler and Goldsmith, Experimental Nucleonics, Reinhart & Co., N.Y. (1957)
- (2) Federal Regulations Title 10, parts 20 and 30
- (3) National Bureau of Standards Handbooks 42, 48 and 51.