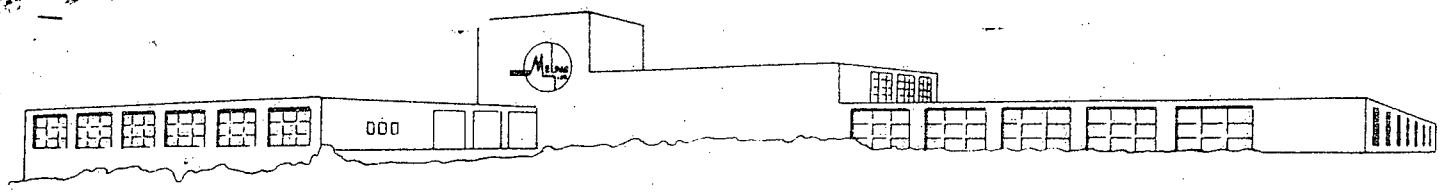
45-7548-1



MELPAR, INC. 3000 ARLINGTON BOULEVARD, FALLS CHURCH, VIRGINIA · JEFFERSON 4-6000

8 June 1961

U. S. Atomic Energy Commission
Washington 25, D. C.

Attn: Mr. J. R. Mason, Chief
Isotopes Branch
Division of Licensing and Regulation

Re: Application for Byproduct Material License

Gentlemen:

Enclosed are three executed copies of application (Form AEC-313), dated 8 June 1961, for a license for byproduct material Carbon 14.

If there is need for any additional available information, please advise and we will be glad to furnish it.

Very truly yours,

MELPAR, INC.

Austin G. Roe
House Counsel

Encs. 3

b1

45-7548-1

Form AEC-313
(5-58)

ATOMIC ENERGY COMMISSION

APPLICATION FOR BYPRODUCT MATERIAL LICENSE

Form approved
Budget Bureau No. 38-R027.4

INSTRUCTIONS.—Complete Items 1 through 16 if this is an initial application. If application is for renewal of a license, complete only Items 1 through 7 and indicate new information or changes in the program as requested in Items 8 through 15. Use supplemental sheets where necessary. Item 16 must be completed on all applications. Mail three copies to: U. S. Atomic Energy Commission, Washington 25, D. C. Attention: Isotopes Branch, Division of Licensing and Regulation. Upon approval of this application, the applicant will receive an AEC Byproduct Material License. An AEC Byproduct Material License is issued in accordance with the general requirements contained in Title 10, Code of Federal Regulations, Part 30 and the Licensee is subject to Title 10, Code of Federal Regulations, Part 20.

1. (a) NAME AND STREET ADDRESS OF APPLICANT. *(Institution, firm, hospital, person, etc.)*

Melpar, Inc.
3000 Arlington Blvd.
Falls Church, Va. (Fairfax County)

4

(b) STREET ADDRESS(ES) AT WHICH BYPRODUCT MATERIAL WILL BE USED. *(If different from 1 (a).)*

2. DEPARTMENT TO USE BYPRODUCT MATERIAL

Research Division

3. PREVIOUS LICENSE NUMBER(S). *(If this is an application for renewal of a license, please indicate and give number.)*

4. INDIVIDUAL USER(S). *(Name and title of individual(s) who will use or directly supervise use of byproduct material. Give training and experience in Items 8 and 9.)*

Dr. John F. Ambrose, Supervisor
Physical Chemistry Branch

Mr. Gerald Halpert, Physical Chemist

5. RADIATION PROTECTION OFFICER *(Name of person designated as radiation protection officer if other than individual user. Attach resume of his training and experience as in Items 8 and 9.)*

Mr. Louis Glekas
Research Division Safety Officer

6. (a) BYPRODUCT MATERIAL. *(Elements and mass number of each.)*	**(b) CHEMICAL AND/OR PHYSICAL FORM AND MAXIMUM NUMBER OF MILLICURIES OF EACH CHEMICAL AND/OR PHYSICAL FORM THAT YOU WILL POSSESS AT ANY ONE TIME.** *(If sealed source(s), also state name of manufacturer, model number, number of sources and maximum activity per source.)*	
Carbon 14	Organic Compounds	Total to be 200 millicuries

7. DESCRIBE PURPOSE FOR WHICH BYPRODUCT MATERIAL WILL BE USED. *(If byproduct material is for "human use," supplement A (Form AEC-313a) must be completed in lieu of this item. If byproduct material is in the form of a sealed source, include the make and model number of the storage container and/or device in which the source will be stored and/or used.)*

For use as tracer material for investigating mechanisms of chemical reactions and the resulting molecular structure of products.

35211

(Continued on reverse side)

TRAINING AND EXPERIENCE OF EACH INDIVIDUAL NAMED IN ITEM 4 *(Use supplemental sheets if necessary)*

8. TYPE OF TRAINING	WHERE TRAINED	DURATION OF TRAINING	ON THE JOB (Circle answer)	FORMAL COURSE (Circle answer)
a. Principles and practices of radiation protection	See Attached Sheet		Yes No	Yes No
b. Radioactivity measurement standardization and monitoring techniques and instruments			Yes No	Yes No
c. Mathematics and calculations basic to the use and measurement of radioactivity			Yes No	Yes No
d. Biological effects of radiation			Yes No	Yes No

9. EXPERIENCE WITH RADIATION. *(Actual use of radioisotopes or equivalent experience.)*

ISOTOPE	MAXIMUM AMOUNT	WHERE EXPERIENCE WAS GAINED	DURATION OF EXPERIENCE	TYPE OF USE
		See attached Sheet		

10. RADIATION DETECTION INSTRUMENTS. *(Use supplemental sheets if necessary.)*

TYPE OF INSTRUMENTS *(Include make and model number of each)*	NUMBER AVAILABLE	RADIATION DETECTED	SENSITIVITY RANGE *(mr/hr)*	WINDOW THICKNESS *(mg/cm²)*	USE *(Monitoring, surveying, measuring)*
See Attached Sheet					

11. METHOD, FREQUENCY, AND STANDARDS USED IN CALIBRATING INSTRUMENTS LISTED ABOVE.

See Attached Sheet

12. FILM BADGES, DOSIMETERS, AND BIO-ASSAY PROCEDURES USED. *(For film badges, specify method of calibrating and processing, or name of supplier.)*

See Attached Sheet

INFORMATION TO BE SUBMITTED ON ADDITIONAL SHEETS

13. FACILITIES AND EQUIPMENT. Describe laboratory facilities and remote handling equipment, storage containers, shielding, fume hoods, etc. Explanatory sketch of facility is attached. *(Circle answer)* Yes, No X

Attached Sheet

14. RADIATION PROTECTION PROGRAM. Describe the radiation protection program including control measures. If application covers sealed sources, submit leak testing procedures where applicable, name, training, and experience of person to perform leak tests, and arrangements for performing initial radiation survey, servicing, maintenance and repair of the source.

Attached Sheet

15. WASTE DISPOSAL. If a commercial waste disposal service is employed, specify name of company. Otherwise, submit detailed description of methods which will be used for disposing of radioactive wastes and estimates of the type and amount of activity involved.

Attached Sheet

CERTIFICATE (This item must be completed by applicant)

16. THE APPLICANT AND ANY OFFICIAL EXECUTING THIS CERTIFICATE ON BEHALF OF THE APPLICANT NAMED IN ITEM 1, CERTIFY THAT THIS APPLICATION IS PREPARED IN CONFORMITY WITH TITLE 10, CODE OF FEDERAL REGULATIONS, PART 30, AND THAT ALL INFORMATION CONTAINED HEREIN, INCLUDING ANY SUPPLEMENTS ATTACHED HERETO, IS TRUE AND CORRECT TO THE BEST OF OUR KNOWLEDGE AND BELIEF.

RECEIVED
JUN 13 1961
U.S.A.E.C.
Isotopes Branch
Div. of L & R

Melpar, Inc.
Applicant named in item 1

Date 8 JUNE 1961

By: Paul E. Ruth

DIRECTOR OF RESEARCH
Title of certifying official

WARNING.—18 U. S. C., Section 1001; Act of June 25, 1948; 62 Stat. 749; makes it a criminal offense to make a willfully false statement or representation to any department or agency of the United States as to any matter within its jurisdiction.

8. Dr. John F. Ambrose, Supervisor, Physical Chemistry Branch

B. S. Chemistry, University of Santa Clara.

M. S., Ph.D. Chemistry, Harvard University.

Dr. Ambrose's experience with radioisotopes including categories

a) Principles and practices of radiation protection

b) Radioactivity measurements standardization and monitoring techniques and instruments.

c) Mathematics and calculations basic to the use and measurement of radioactivity was recieved as a graduate student at Harvard, [Ex. 6] Ex6 utilizing Ag 110 in millicurie amounts as a tracer in the study of the inhibition of the enzyme urease by heavy metals. The training can be described best as on-the-job training, although the formal courses in physical, inorganic and analytical chemistry, as well as the formal research courses taken at that time had a radiochemical content.

Association with radiochemical methods continued during his tenure as a Staff Member, Bell Telephone Laboratories, Murray Hill, New Jersey, 1949-1958 During the latter portion of this period he was directly concerned with the formation and training of the Radchem Civil Defense teams in the New Jersey area. The latter training and experience pertains primarily to category d) Biological effects of radiation training over a period of 2 years, 1956-1958. Further on-the-job training and experience has been obtained at Melpar during the course of investigations utilizing AEC license exempt quantities of C-14.

8. Dr. John F. Ambrose

Summary:	Where Trained	Duration	On the Job	Formal Course
	Harvard Univ. Grad. School	1½ years	yes	yes
8 (a)	Melpar, Inc. Falls Church, VA	6 months	yes	no
	Harvard Univ. Grad. School	1½ years	yes	yes
	Bell Telephone Labs	4 years	yes	no
	RADCHEM Civil Defense	6 months	no	yes
8 (b)	Melpar, Inc. Falls Church, Va	6 months	yes	no
	Harvard Univ. Grad. School	1½ years	yes	yes
8 (c)	Melpar, Inc. Falls Church, Va.	6 months	yes	no
	RADCHEM Civil Defense	6 months	no	yes
8 (d)	Melpar, Inc.	6 months	yes	no

8. Gerald Halpert, Physical Chemist

B.S. Chemistry - Rutgers University

Graduate Work - Physical Chemistry, American University

During his undergraduate work at Rutgers University where he majored in Physical Chemistry, Mr. Halpert was exposed to radiochemical techniques in theory. Mr. Halpert has had 5 years of industrial experience and while at Melpar has received applied training in radiation, safety, theory, and experimental methods while investigating problems in which AEC license exempt quantities of carbon-14 were used.

Summary:	Where trained	Duration	On the Job	Formal Course
8 (a)	Melpar, Inc. Falls Church, Va.	6 months	yes	no
8 (b)	" " " " "	6 months	yes	no
8 (c)	" " " " "	6 months	yes	no
8 (d)	" " " " "	6 months	yes	no

8. Louis P. Glekas

B. S. Chemistry - Georgetown University

Several months of on-the-job training at Melpar on the principles and practices of radiation protection. As the Research Division's Safety Officer, it is necessary to monitor all laboratory operations from the standpoint of general laboratory safety. This includes general surveillance of health physics aspects with operations connected with A.E.C. license exempt quantities of source and by-product materials as well as the following general laboratory duties:

1. Reviewing requisitions for chemical procurement to assure that the necessary safety requirements are fulfilled (includes handling and storage) for toxic or dangerous materials.

2. Monitor laboratory for appropriate warning posters and labels.

3. Survey storage and working areas at specified intervals.

4. Supervise disposal of toxic or dangerous materials.

Summary:	Where trained	Duration	on the job	formal course
8 (a)	Melpar, Inc. Falls Church, Va.	3 months	yes	no
8 (b)	" " " " "	3 months	yes	no
8 (c)	" " " " "	3 months	yes	no
8 (d)	" " " " "	3 months	yes	no

9. In the Melpar Radiochemistry Laboratory, measurements have been made, using the Baird-Atomic Scintillation, Geiger and proportional counting instruments, on organic compounds containing less than 50 microcuries of Carbon 14. Other radioactive chemicals which are found in the Nuclear-Chicago Radionuclide Set have been investigated as part of the plan to become familiar with handling and measuring techniques. Radioactive standards are also maintained as part of this program.

Summary:	Isotope	Max. Amt.	where experience	Duration	Type of use
Ambrose	Ag 110	millicuries	Harvard Univ.	4 years	Enzyme studies
	C-14	microcuries	Melpar, Inc.	6 months	Experimental Tracer Studies
Halpert	C-14	microcuries	Melpar, Inc.	6 months	Experimental Tracer Studies
Glekas	C-14	microcuries	Melpar, Inc.	6 months	Experimental Tracer Studies

10. a) Logarithmic Survey Meter, 1 available, Detects beta, gamma, x-rays

Baird-Atomic #444

Ranges - Window thickness - .9 mg/cm^2

3-300 mr/hr

300-3000 mr/hr

Used for measuring and monitoring

b) End window flow counter in geiger or proportional regions

1 available, detects beta and gamma

The combined unit consists of the following:

Baird Atomic Flow Counter Model 821B

Baird Atomic Proportional Amplifier Model 255

Baird Atomic High Voltage Power Supply Model 319

Baird Atomic Glow Tube Scaler Model 131A

Window thickness 0.7 mg/cm^2

Used for measuring the activity of Smears.

Range: 0 - 1 x 10^7 counts.

<u>Instruments on Order But Not Yet Received</u>

c) Model TSM-91A Tritium Monitor from Atomic Accessories Inc. One ordered - detects tritium, C-14, and other low energy beta emitters. Sensitivity 0-10^2, 0-10^3, 0-10^4, 0-10^5 microcuries of tritium per cubic meter of air. (Conversion factors are applied to meter readings for other radioactive gases such as C-14 and Krypton-85) Instrument will be used for monitoring.

d) Model 2612 count rate meter with Model P-16 probe and Model D-35 end window counter from Nuclear-Chicago Corp. One ordered - detects alpha, beta and gamma radiation. Sensitivity - three ranges cover radiation intensities of .2, 2, and 20 mr/hr, full scale corresponding to 600, 6000, and 60,000 counter per minute. Window thickness is 1.4 mg/cm^2. Instrument to be used for surveying and measuring.

11. a) The survey meter utilizes a built-in standard so that in adjusting the meter for use (whenever someone is in the laboratory) the operator must pass a calibration stage. Also a radiation standard is available.

b) Calibrated by using C^{14} standards once every 3 months.

c) Will be calibrated weekly by its response to ionization produced by alpha particles emitted from the surface of a calibrated source.

d) Equipped with calibrated reference source. To be calibrated at least once a week.

Film badges which measure Beta, gamma, and x-rays are exchanged weekly. Weekly reports as well as quarterly cumulative reports are sent to Melpar by Tracerlab Film Badge Service.

13. Facilities and Equipment (Temp. Storage Area not Included)

The radiochemistry laboratory consists of a 14' x 17½' x 8' high room. The floor consists of asphalt tile and the walls are dry wall to the ceiling. The room is labeled, indicating radioactive materials use. The room is kept locked at all times and can be opened by either the Physical Chemistry Branch Supervisor or his authorized designate. The room has its own ventilation duct and is illuminated by flourescent fixtures. The table tops are of continuous formica. There is available in the room a sink with hot and cold running water. A 4' fume hood ducted directly to the outside gives adequate work space for operations that require increased ventilation requirements.

Within the laboratory are included the following items:

1) Laboratory cross bars for experimental set ups.
2) Radioactive storage area beneath and next to the fume hood.
3) Lead bricks and lead carrying case are on hand for anticipated use with nuclear materials.
4) Stainless steel waste container with plastic bags for dry wastes.
5) Remote pipetter.
6) Logarithmic Survey Meter (Baird Atomic #444) for measuring beta, gamma and x-rays.
7) Radiation Counter Heathkit RC-1 for surveying and monitoring beta and gamma radiation.
8) Large Lucite box for storing C^{14} by-product materials.

Items that have not as yet been received but are forthcoming for the laboratory include:

1) 9 cu. ft. refrigerator.
2) Extended handles for sink.
3) Large polyethylene container for liquid wastes.

14. Radiation Protection Program

I. An Isotope Committee composed of the Director of Research, Head of Administrative Staff Research Division, Supervisor of the Physical Chemistry Branch, Company Safety Engineer and Radiation Safety Officer will review and approve, in advance of their purchase all requests for use of radioisotopes.

Additional personnel connected with the Radiation Protection Program will be the Planning and Disposal Officer, Nurse, and individuals who have duties related to radioactive materials. Adherence to the program will be monitored by the Company Safety Engineer.

Responsibilities designated to other persons connected with the Radiation Protection program are as follows:

A. Radiation Safety Officer

The Radiation Safety Officer will be responsible for:

1) Furnishing consulting services on all aspects of radiation protection.

2) General surveillance of all health physics activities, including the assisting of individuals and supervisors in discharging their responsibilities.

3) Distribution and processing of personnel monitoring equipment excluding the film badge service.

4) Indoctrination of personnel in the proper procedure for the use of radioactive material.

5) Supervision and coordination of the waste disposal program, including the monitoring of waste storage records.

6) Insuring the proper storage of all by-product material not in current use.

7) Monitoring inventory of all radioactive materials.

8) Supervising decontamination in cases of contaminating accidents.

9) A continuous program of environmental radiation hazard evaluation and hazard elimination.

10) Monthly physical inventory of all radioactive materials.

11) Reporting of all incidents involving by-product materials to the Nurse.

12) Reporting of all incidents through the Company Safety Engineer pursuant to 10CFR20.402, 20.403 and 20.405.

B. Supervisor's Responsibility

The supervisor is responsible for insuring that the individual's responsibilities are carried out. He is further responsible for:

1) Adequate planning before an experiment is performed. This will give an indication of the protection required.

2) Instructing employees for whom he is responsible in the use of safe techniques and in the application of approved radiation safety practices.

3) Furnishing the Radiation Safety Officer with information concerning individuals and activities in his areas, particularly additions or or deletions from his personnel roster, as well as vacations, etc.

4) Contacting the Radiation Safety Officer whenever major changes in operational procedures, new techniques, alterations in physical plant, or new operations which might lead to personnel exposure are anticipated.

5) Complying with the AEC regulations governing the use of radioactive materials for:

(a) Correct procedure for the procurement of radioactive materials.

(b) Posting radiation areas pursuant to Title 10CFR 20.203 and 20.206.

(c) Accounting for the disposition and amounts of radioactive materials in his area.

(d) Assuring that all radioactive waste materials are consigned to the Planning Disposal Officer for disposal.

6) Authorization of all persons entering the Radiochemical Lab or in his absence designating a responsible person to perform this function.

C. Individual Responsibility

Any individual who has contact with radioactive materials is responsible for:

1) Observing all safety rules and regulations.

(a) Wearing the prescribed monitoring equipment such as film badges and pocket dosimeters, in radiation areas.

(b) Utilizing all appropriate protective measures that are available.

(c) Not smoking or eating in laboratory.

(d) Maintaining good personal hygiene.

(e) Keeping the laboratory neat and clean.

2) Labeling and isolating radioactive waste and equipment, such as glassware, used in laboratories for radioactive materials.

3) Requesting Radiation Safety Officer's supervision of any emergency repair of contaminated equipment in laboratory by shop personnel or by commercial service personnel.

4) Reporting accidental inhalation, ingestion or injury involving radioactive materials to his supervisor, the Nurse, and Radiation Safety Officer.

5) Carrying out decontamination procedures when necessary

D. Planning and Disposal Officer

The Planning Disposal Officer will be responsible for:

1) Procuring through the Melpar Purchasing Dept. The requested radioisotopes.

2) Delivering all radioisotopes from Melpar Receiving to Radio-chemical Laboratory.

3) Providing the necessary assistance to the Radiation Safety Officer in laboratory maintenance and repair.

4) Directly responsible for the proper disposal of all solid and liquid waste as per the requirements of the Radiation Safety Officer.

E. Nurse

1) Maintains occupational radiation history and records of exposure of each individual on forms AEC 4 and 5.

2) Responsible for maintaining the weekly film badge service.

3) Reports to Supervisor and takes the necessary action in case of excessive exposure to radiation by an individual.

4) Responsible for preparing information for the Radiation Safety Engineer and Company Safety Engineer for notification of incidents to the Atomic Energy Commission pursuant to 10CFR 20.403 (a) (1), 20.403 (b) (1), 20.405 (a) (1) and (2).

5) Reports to employees and former employees pursuant to 10 CFR 20.404, 20.405 and 20.405 (b).

II. Marking of Laboratory Areas and Equipment

All equipment contaminated with radioactive material shall be marked with signs, decals or other conspicuous means.

Marking of areas, containers, etc., must be made in accordance with Federal Register Title 10, Part 20, paragraphs 20.203, 20.204, 20.205 and 20.206.

III. Storage

All radioactive materials must be clearly labeled at all times, giving pertinent and accurate information about the contents as well as identifying the person who is responsible for the source.

A. Permanent Storage Location

1) The permanent storage location will be maintained within the Radiochemistry Laboratory.

2) The permanent storage location will be protected from entrance by unauthorized personnel. It will be conspicuously posted with signs designating the area as a radiation storage area.

3) Radiation from Permanent Storage Area to work area will not exceed 1 mr/hr.

B. Temporary Storage

The temporary storage area will be protected from entrance by unauthorized personnel. The temporary storage area will be properly labeled to indicate that radioactive materials are being stored therein.

IV. Shielding

Shielding materials will be chosen with reference to the type of radiation involved. In the case of C^{14} by-product material the beta activity will be shielded with low atomic number materials such as lucite, wood or aluminum to reduce Bremsstrahlung radiation.

V. Maximum Permissible Exposure of Personnel to External Radiation (Whole Body)

Type of Radiation	Permissible Exposure
Beta	2.5 mrem/hr. or 100 mrem/week*

*The maximum permissible exposure to the hands and forearms only can be 1.4 rem/week.

VI. General Laboratory Procedures

Responsibilities of Radiation Safety Officer
Responsibilities of Physical Chemistry Branch Supervisor
Responsibilities of Individuals

} See Section 14-I A, B & C

Routine Surveys and Personnel Monitoring

A. A routine weekly area survey of the Radiochemistry Laboratory will be conducted by an individual designated by the Physical Chem Branch Supervisor. Those areas surveyed will include the floor, bench tops, fume hood and any area or equipment where there is a possibility of contamination being present (storage area). This survey will be conducted with the logarithmic survey meter. All readings, with the area and date will be recorded. The readings in any of these areas should not exceed 1 mr/hr.

A routine monthly survey of the Radiochemistry Laboratory will be conducted by the same individual in the Radiochemistry Lab and temporary storage area.

B. In the monthly survey, smear tests will be run on the same areas and equipment as designated above and any area in the temporary storage room where there is a possibility of contamination being present. The smears will be measured with the available equipment and recorded. The readings in any of these areas should be less than 50 c/m for beta.

Areas found to be contaminated above tolerance levels must be decontaminated immediately by the responsible person involved under the direction of the Radiation Safety Officer and the Supervisor.

C. The storage area must be resurveyed when new materials are introduced.

D. In order to be sure that the exhaust of the fumehood is in proper working order an monthly survey of the air flow through the hood will be made by a responsible individual. The air flow must be at least 100 linear ft./min. If the air flow is less than this the Radiation Safety Officer must be notified.

E. Film badges will be worn at all times in those areas where ionizing radiation is present. The film badges are issued for one week to record the radiation dose received. The film badge must not be left in a radiation area since an erroneous reading will be made for the individual to whom it has been assigned. Film badges will be issued on Monday morning and must be returned to the nurse by Friday evening of the same week.

F. Results of all surveys must be reported to the Radiation Safety Officer and the Company Safety Engineer.

VII. Instruction of Personnel

In order for any new employee to be eligible to work in the Radiochemistry Laboratory he or she must first be instructed by the Physical Chemistry Branch supervisor and the Radiation Safety Officer in the necessary safety problems associated with exposure to such materials as are used in the Radiochemistry Lab and in precautions or procedures to minimize exposure.

The location of form AEC-3 and the AEC regulations Title 10, Part 20 "Standards for Protection Against Radiation" will be brought to the attention of the employee at the time of the Radiation Safety Officer's orientation.

VIII. Safe Radiochemistry Laboratory Practices

Personnel working in the Radiochemistry Laboratory must obey the following rules at all times:

1) Smoking, drinking, or eating is prohibited.

2) Food must not be kept in the refrigerator.

3) Fingernails must be kept short.

4) Gas masks or respirators of a type approved by the Radiation Safety Officer must be worn when there is any danger of radioactivity in the air from sprays, dusts, gas evolution, etc.

5) No solution, regardless of its nature can be pipetted by mouth or any laboratory equipment be allowed to touch one's mouth.

6) Lab coats must be worn in the laboratory.

7) Any cuts or skin lesions should be reported to the nurse.

8) In the case of contamination such as a spill the following procedure must be followed:

a) Liquids should be blotted up with absorbent paper with a water proof backing and gloves should be worn during the process. When

the surface is dry a survey should be made with a suitable meter. The surface should be scrubbed until a background reading is obtained and the level of contamination as determined by a smear test is below 1 mr/hr.

All disposable material contaminated by the spill must be placed in the radioactive waste can.

IX. Procurement and Records

Requests for R & D uses of radio isotopes shall be reviewed and approved in advance of purchase of the radio isotopes by the Isotope Committee which is composed of: the Director of Research, Head of Administrative Staff Research Division, the Radiation Safety Officer, the Supervisor of the Physical Chemistry Branch and Company Safety Engineer.

All requests for radioactive materials (C^{14}) will be submitted in duplicate on Melpar form ENG-839 (Planning Request). The originator will specify the vendor, catalog number, A.E.C. license no., quantity requested, chemical form and specific activity of the compound. The planning request will be sent to the Physical Chemistry Branch Supervisor for approval. Upon approval by the Physical Chemistry Branch Supervisor, the planning request will be sent to the Radiation Safety Officer. The Radiation Safety Officer will be responsible for determining that the activity of by-product material specified in the AEC license is not exceeded. This will be designated by his initialing the planning request. The planning request will then be sent to the Planning and Disposal Officer at which time he will initiate a Purchase Requisition for the material(s) and in addition specify Radioactive Material on requisition. The planning request will then be initialed by the Head of Administrative Staff Research Division and Director of Research and Company Safety Engineer. The Planning and Disposal Officer will then log the Purchase Request No. on form ENG-839 and send the carbon copy back to the originator for file.

A Radioactive Materials Log Book will be kept by the Physical Chemistry Branch. This log book will contain a separate page for each C-14 compound

received. The information kept on each compound will consist of the following: Compound name, Specific activity, Purchase Order, Planning Request no. activity and date received, date and activity issued, temporary disposal, as liquid or solid, date and activity disposed and container number. Permanent disposal as gas, liquid or solid, date, area and activity disposed and container no. and remaining activity in stock. At the end of each month a physical inventory of all radioactive material will be made by the Radiation Safety Officer.

Occupational radiation history and records of exposure of personnel, AEC forms 4 and 5, will be kept by the Company Nurse, and will be available to the Physical Chemistry Branch Supervisor and Radiation Safety Officer at their request.

In addition, a survey log will be kept to record the date, readings and area of each weekly and monthly surveys conducted in the Radiochemical laboratory and temporary storage room.

15. Waste Disposal (C^{14})

Waste Containers

To insure that solid and liquid radioactive waste is kept separate, the radiochemical laboratory will have (properly marked) a solid dry waste container and a liquid waste container.

a) The solid dry waste container will be fitted with a disposable polyethylene liner.

b) Glass jugs or bottles can be used for liquid wastes. If the liquid waste container is glass or ceramic it must be kept in such a manner that if accidently broken, the contents will be retained in a small area, e.g., have it set in a large pan.

c) Both the solid and liquid containers will be conspicuously marked "Radioactive Waste."

Waste Pick-up

Both solid and liquid waste will be transferred at the end of each working day from the Radiochemistry Lab to the temporary storage room. Under the supervision of the Radiological Safety Officer this waste will be disposed of by the Planning and Disposal Officer in the following manner.

Waste Disposal

Solutions of radioactive material (not solids or suspensions) will be discharged into the sewer so as not to exceed the AEC level of .015 mc/gal of C^{14}. Melpar routinely discharges an average of 10^6 gal/month of water to the sewage system.

Solid radioactive material will be buried at a minimum depth of 4 feet in a designated well marked area whenever the AEC limit (50 mc C^{14}) is approached. Successive burials will be separated by distances of at least 6 feet and not more than 12 burials will be made a year.

Records of all solid and liquid waste disposals will be maintained. These records will include quantity, date and disposal method and in the case of solid waste the burial area will be disigated.