The Christ Hospital

2139 Auburn Avenue | Cincinnati, Ohio 45219 | (513) 369-2000

June 21, 1985

Mr. John Madera
U.S.N.R.C. Region III
Materials Licensing Branch
799 Roosevelt Rd.
Glen Ellyn, IL 60137

RE: License # 34-03831-02
Control # 78680

Dear Mr. Madera:

I. The following information is submitted in support of our license renewal application as you requested per telephone conversation on May 22, 1985.

1. The Radiation Safety Committee will meet at least quarterly.
2. Procedure for Safely Opening Packages Containing Radioactive Material is enclosed as Item 14, Revised 6/85, Page 20. This procedure includes the statement "Measure exposure rate at one meter and record these values."
3. The Procedures for I-131 Handling including bioassays is enclosed as Item 19, 6/85, Pages 26a and 26b.
4. Nursing Instructions for Patients Treated with Brachytherapy Sources is included as Item 20, Revised 6/85, Pages 31 and 32. Frequency of instruction is as stated in Item 12, Revised 6/85, Page 18: Personnel Training Program.
5. A copy of the institutional ALARA program is enclosed.
6. Item 22, Procedures and Precautions for use of Radioactive Material in Animals is included, Page 22-1.
7. The closeout daily survey from the previous Nuclear Medicine Hot lab is enclosed, as well as the last departmental wipe test.

II. In addition to the above revisions and additions, we wish to revise the following Items of the License Application:

1. Item 4, Authorized Users. Please add Kathryn Ann Weichert, M.D., to the license as an authorized user of Groups IV, V and VI. Supplement A is enclosed.

2. Item 10, Alternative methods of testing dose calibrator linearity will include use of the variable thickness well liners, or the following method will be used:

   a. Measure a known activity at varying times over a three day period.
   b. Calculate the expected activity at each time of measurement by using the relationship $A_{(t)} = A_o e^{-\lambda t}$.
   c. Measured activity versus the predicted activity at subsequent intervals based on original activity should be within 5% agreement. Should this this limit be exceeded, more rigorous evaluation of instrument will be performed by the physicist and the instrument will be sent for adjustment as necessary to maintain linearity of performance.

3. Item 12, Revised 6/85, Page 18, Personnel Training Program is enclosed.
4. Item 13, Revised 6/85, Page 19, Procedure for Ordering and Receiving Radioactive Material.

5. Item 15, Revised 6/85, General Rules for Safe Use of Radioactive Material.

6. Item 18, Waste Disposal, Pages 11-17. Both State and NRC approval have been granted for incineration of solid waste and copies of the State and City authorizations are enclosed. Also, included are concentration calculations and other information previously submitted to obtain NRC approval.

7. Item 21, Procedures and Precautions for Use of Radioative Gases. Please revise 3.b. Procedures for Routine Use
A Pulmonex Xenon System Model 130-500 is used for the administration and collection of the Xenon. The system has disposable charcoal traps. Exhaled Xenon is gently pulled through activated charcoal contained within a "U" shaped cartridge, shielded with 1/8" lead, by an induction vacuum pump. The control panel timer and airflow pressure dial regulation of the trap pump assures complete patient and system purging. Only a minimal amount of Xenon is present in the trap exit port effluent. The gas trap cartridge is easily replaced when expended. Room air and trap effluent is continuously monitored with a Xen-Alert system. Concentration values are recorded on a daily basis. If MPC is exceeded, emergency procedures are followed. When the trap is found to be less than 85% efficient by monthly Xen-Alert method of testing trap efficiency, the filter will be replaced.

The saturated charcoal traps are stored for decay in the radioactive waste storage area. When the measured exposure rate reaches background, the traps are disposed of as normal trash.

Please also revise 6.b., Handling of Xe-133 Charcoal Traps, as follows:

Handling of Xe-133 Charcoal Traps

The Xen-Alert continuously monitors room air Xe-133 levels. When the MPC levels are exceeded and no known spill has occurred, the trap will be tested using the Xen-Alert method for testing trap efficiency. The efficiency will routinely be tested monthly also. When efficiency is less than 85%, the saturated trap is removed from the Xenon system. It will be placed in the outside locked concrete storage bin for decay. When the exposure rate measures background, the trap will be disposed of with the normal hospital waste.

Be advised that 20 mCi of Xenon 133 is routinely administered rather than 10 mCi per study as originally stated in the license application. The room Xenon concentration remains well below acceptable levels and the ventilation rate remains significantly greater than required to maintain concentration levels of radioactive gas well below acceptable concentrations.

Should additional information be required, we will be happy to provide such.

Sincerely,

Jack M. Cook
President

JMC/aml

PROCEDURES FOR SAFELY OPENING PACKAGES CONTAINING RADIOACTIVE MATERIAL

1. Put on gloves to prevent hand contamination.

2. Visually inspect package for any sign of damage (e.g. wetness, crushed). If damage is noted, stop procedure and notify Radiation Safety Officer.

As required by 10 CFR 20.205; the following additional steps will be followed:

3. Measure surface exposure rate. If greater than 200 mR/hr, stop procedure and notify Radiation Safety Officer or his designee. Measure exposure rate at one meter from package and record these values. If rate is greater than 10 mR/hr at one meter, notify Radiation Safety Officer.

4. Open the outer package (following manufacturer's directions, if supplied) and remove packing slip. Open inner package to verify contents (compare requisition, packing slip and label on bottle) and check integrity of final source container (inspecting for breakage of seals or vials, loss of liquid, discoloration of packaging material). Check also that shipment does not exceed possession limits.

5. Wipe external surface of final source container with moistened cotton swab or filter paper. Assay and record. (Assay may be performed with thin window G-M survey meter.)

6. Monitor the packing material for contamination before discarding.

   a. If contaminated, treat as radioactive waste.
   b. If not contaminated, obliterate radiation labels before discarding in regular trash.

7. Maintain records of the results of this testing in an appropriate manner.

PROCEDURE FOR HANDLING SODIUM IODIDE I-131 SOLUTIONS

1. Store the I-131 solution bottle in the refrigerator in the lead shipping shield immediately upon receipt. The refrigerator should be maintained at 35° to 40° F. Keep the bottle in the shield at all times.

2. Always wear rubber or plastic gloves when handling I-131 solution.

3. Use fume hood when opening bottle. Always remove the I-131 solution bottle cap at arm's length so that if any iodine escapes upon opening, inhalation of the iodine will be minimized.

4. If a fume hood is not used, do not open bottle in any area where there is a draft. Volatilized iodine is a heavy vapor and will not rise very far under static air conditions.

5. Always transfer the I-131 solution with a bulb (or similar device) aspirated pipet. Never mouth aspirate the pipet.

6. Always use a pipet with the smallest diameter at the tip consistent with the volume to be aspirated. The smaller the volume of the pipet itself, the smaller the volume of air displaced from the bottle.

7. If transferring I-131 solution to another closable container, cap both containers immediately after making the transfer.

8. If transferring I-131 solution to an open container such as a waxed cup or water glass, discharge the pipet at the surface of the water used for dose administration. The water should be chilled, but contain no ice.

9. If the entire contents of the I-131 solution bottle are used, make the transfer as in step 8. Do not pour the solution into the administration container.

BIOASSAY PROGRAM FOR PERSONNEL WHO HANDLE THERAPEUTIC LIQUID I-131

Following administration of greater than 10 mCi of liquid I-131, the person administering the dose shall undergo external counting of their thyroid gland at 10 cm between 24-36 hours post dose. If this value is more than double background, a more extensive bioassay will be initiated with the assistance of the Medical Physicist. The Physicist should be notified within one working day of unacceptable results.

I. INSTRUCTIONS TO NURSES

a. Special restrictions may be noted on the precaution sheet on the patient's chart. Nurses should read these instructions before administering to the patient. The Radiation Safety Officer should be contacted to answer any questions about the care of these patients in regard to radiation safety precautions.

b. Nurses should spend only the minimum time necessary near a patient for routine nursing care. *Nurses should stand behind lead shields as much as possible when providing patient care.

c. When a nurse is assigned to a therapy patient, a film badge or pocket dosimeter may be issued and appropriate instructions will be indicated on the Nursing Instruction Sheet in the patient's chart. It has been demonstrated that annual exposure to nurses caring for radioactive patients is less than 500mR and therefore monitoring devices are not automatically issued.

d. Pregnant nurses should not be assigned to the personal care of these patients.

e. Never touch needles, capsules or containers holding brachytherapy sources. If a source becomes dislodged, use long forceps and put it in the corner of the room or in the shielded container provided; contact Radiation Medicine, ext. 2323 or the Radiation Safety Officer, ext. 1197 or 2249.

f. Bed bath given by the nurse should be omitted while the sources are in place.

g. Perineal care is not given during gynecologic treatment; the perineal pad may be changed when necessary unless orders to the contrary have been written.

h. Surgical dressings and bandages used to cover the area of needle insertion may be changed only by the attending physician or radiotherapist and MAY NOT BE DISCARDED until directed by the radiotherapist. Dressings should be kept in a basin until checked by the Radiation Safety Officer or his designee.

Special orders will be written for oral hygiene for patients with oral implants.

i. No special precautions are needed for sputum, urine, vomitus, stools, dishes, instruments or utensils unless specifically ordered, but some of these items should be saved for a check with a radiation survey meter to ensure that no sources have been inadvertently displaced in them, depending upon the site of the implant. For example, urine from prostate implant patients is strained since radioactive seeds can be passed through the urethra, but a sputum specimen would not have to be surveyed.

j. If indicated on Nursing Instruction Sheet, bed linens must be checked with a radiation survey meter before being removed from the patient's room to ensure that no dislodged sources are inadvertently removed.

I. INSTRUCTIONS TO NURSES (continued)

k. These patients must stay in bed unless orders to the contrary are written. In any event, patients will remain in their assigned rooms during the treatment period.

l. Visitors will be limited to those 18 years of age or over unless other instructions are noted on the Nursing Instruction Sheet on the patient's chart.

m. Visitors should sit at least 6 feet (or 2m) from the patient and should remain no longer than the time specified on the form posted on the patient's door. Typically, visitors are allowed to visit two hours per day.

n. No nurse, visitor or attendant who is pregnant should be permitted in the room of a patient while brachytherapy sources are implanted in the patient. Female visitors should be asked whether they are pregnant.

PROGRAM FOR MAINTAINING OCCUPATIONAL
RADIATION EXPOSURE ALARA

THE CHRIST HOSPITAL

August 15, 1980

I. Management Commitment

a. We, the management of this hospital, are committed to the program described in this paper for keeping exposures (individual and collective) as low as reasonably achieveable (ALARA). In accord with this commitment, we hereby recognize the Radiation Safety Committee, which has representation from the hospital administration, as the official hospital organization which will foster the ALARA concept, promote its use, and review the results.

b. The Radiation Safety Officer, who is a voting member of the Radiation Safety Committee, will perform an annual review to determine the adherence to the ALARA concept. It will be his responsibility to review the past exposure records and operating procedures and if he deems necessary to make recommendations to the RSC as to how exposures might be lowered. The review will be evaluated by the chief administrative officer of the hospital or his designee. The review will then be evaluated by the RSC at the first regularly scheduled meeting following the audit.

c. Modification to operating and maintenance procedures and to equipment and facilities will be made where they will significantly reduce exposures at reasonable costs. We will be able to demonstrate that the review has been evaluated, that modifications have been considered where appropriate, and that they have been implemented where reasonable. Where modifications have been considered but not implemented, we will be prepared to describe the reasons for not implementing them.

d. In addition to maintaining doses to individuals as far below the limits as is reasonably achieveable, the sum of the doses received by all exposed individuals will also be maintained at the lowest practicable level. It would not be desirable, for example, to hold the highest doses to individuals to some fraction of the applicable limit if this involved exposing additional people and significantly increasing the sum of radiation doses received by all involved individuals.

II. Radiation Safety Committee

a. Review of the Proposed Users and Uses

1. The RSC will thoroughly review the qualifications of each applicant with respect to the types and quantities of materials and uses for which he has applied to assure that the applicant will be able to take appropriate measures to maintain exposure ALARA.

2. When considering a new use of byproduct material, the RSC will review the efforts of the applicant to maintain exposure ALARA. The user should have systematized procedures to ensure ALARA, and should have considered the use of special equipment such as syringe shields, rubber gloves, etc. in his proposed use.

3. The RSC will ensure that the user justifies his procedures and that they are consistent with ALARA concepts.

b. Delegation of Authority

1. The RSC will delegate sufficient authority to the RSO for enforcement of the ALARA concept.

2. The RSC will support the RSO in those instances where it is necessary for the RSO to assert his authority. Where the RSO has been overruled, the Committee will record the basis for its action in the minutes of the committee's quarterly meeting.

c. Review of the ALARA Program

1. The RSC will encourage all users to review current procedures and develop new procedures as appropriate to implement the ALARA concept.

2. The RSC will perform a quarterly review of occupational radiation exposure with particular attention to instances where Investigational Levels in Table I below are exceeded. The principle purpose of this review is to assess trends in occupational exposure as an index of the ALARA program quality and to decide if action is warranted when Investigational Levels are exceeded (see paragraph VI).

3. The RSC will evaluate our institutional's overall efforts for maintaining exposures ALARA on an annual basis. This review will include the efforts of the RSO, authorized users, and workers.

d. Educational Responsibilities for an ALARA Program

The RSC will ensure that continuing education has been provided for the appropriate employees to keep them abreast of the ALARA Program and of the RSC's, RSO's, and administration's commitment to the ALARA philosophy.

III. Radiation Savety Officer (RSO)

a. Annual and Quarterly Review

1. Annual review of the Radiation Safety Program. The RSO will perform an annual review of the Radiation Safety Program for adherence to ALARA concepts. Reviews of specific procedures may be conducted on a more frequent basis.

2. Quarterly review of Occupational Exposures. The RSO will review at least quarterly the external radiation exposures of authorized users and workers to determine that their exposures are ALARA in accordance with the provision of paragraph VI of this program.

3. Quarterly review of records of Radiation Level Surveys. The RSO will review radiation levels in unrestricted and restricted areas to determine that they were at ALARA levels during the previous quarter.

b. Cooperative Efforts for Development of ALARA Procedures

1. The RSO will maintain close contact with all users and workers in order to develop ALARA procedures for working with radioactive materials.

2. The RSO will encourage and evaluate suggestions from individual workers for improving health physics practics.

c. Reviewing Instances of Deviation from ALARA Practices

The RSO will ensure that all instances of known deviation from ALARA practices will be investigated; and if possible, the causes will be determined. When the cause is known the RSO will recommend changes in the program to maintain exposures ALARA.

IV. Authorized Users

a. New Procedures Involving Potential Radiation Exposure

1. The authorized user will consult with and obtain the approval of RSO and RSC before using radioactive materials for a new procedure.

2. The authorized user will evaluate all procedures before using radioactive materials to ensure that exposures will be kept ALARA. This may be enhanced through the application of trial runs.

b. Responsibility of Authorized Uses to Those He Supervises

1. The authorized user will convey the importance of and his commitment to the ALARA Program to those he supervises.

2. The authorized user will ensure that those under his supervision who are subject to occupational radiation exposure have been trained and educated in good health physics practices and in maintaining exposures ALARA.

V. Persons Who Receive Occupational Radiation Exposure

a. The worker will be instructed in the ALARA concept and its relationship to his working procedures and work conditions.

b. The worker will be informed as to what recourses are available if he feels that ALARA is not being promoted on the job.

VI. The Establishment of Investigational Levels in Order to Monitor Individual Occupational External Radiation Exposures

This institution hereby establishes Investigational Levels for occupational external radiation exposure which, when exceeded, will initiate review or

investigation by the Radiation Safety Committee and/or the Radiation Safety Officer. The Investigational Levels that we have adopted are listed in Table 1 below. These levels apply to the exposure of individual workers arising in whole or in part from NRC licensed byproduct material.

Table 1

	Investigational Levels (mrems per calendar quarter)	
	Level I	Level II
1. Whole body; head and trunk; active blood-forming organs; lens of eyes; or gonads.	200	500
2. Hands and forearms; feet and ankles.	1,875	5,625

The Radiation Safety Officer will review the results of personnel monitoring, not less than once in any calendar quarter, as is required by 10 CFR 20, 20.401. The following actions will be taken at the Investigational Levels as stated in Table 1:

a. Quarterly exposure of individuals to less than Investigational Level I.

Except when deemed appropriate by the RSO, no further action will be taken in those cases where an individual's exposure is less that Table I values for the Investigational Level I.

b. Personnel exposures equal to or greater than Investigational Level I, but less than Investigational Level II.

The RSO will review the exposure of each individual whose quarterly exposures equal or exceed Investigational Level I. He will report the results of his reviews at the first RSC meeting following the quarter when the exposure was recorded. If the exposure does not equal or exceed Investigational Level II, no action related specifically to the exposure is required unless deemed appropriate by the Committee. The Committee will, however, consider each such exposure in comparison with those of others performing similar tasks as an index of ALARA Program quality and will record the review in the Committee minutes.

c. Exposure equal to or greater than Investigational Level II.

The RSO will investigate in a timely manner the cause(s) of all personnel exposures equaling or exceeding Investigational Level II and, if warranted, take action. A report of the investigation, actions taken, if any, and a copy of the individual's exposure history will be presented to the RSC at the first RSC meeting following completion of the investigation. The details of these reports will be recorded in the committee minutes. Committee minutes will be sent to the management of this institution for review. The minutes, containing details of the investigation, will be made available to NRC inspectors for review at the time of the next inspection.

d. Re-establishment of an individual occupational worker's Investigational Level II above that listed in Table I.

In cases where a worker's or group of workers exposures need to exceed Investigational Level II, a new, higher Investigational Level II may be established on the basis that it is consistent with good ALARA practices for that individual or group. Justification for a new Investigational Level II will be documented.

The Radiation Safety Committee will review the justification for, and will approve, all revisions of Investigational Levels II. In such cases, when the exposure equals or exceeds the newly established Investigational Level II, those actions listed in paragraph c above will be followed.

VII. Signature of Certifying Official

I hereby certify that this institution has implemented the ALARA Program set forth above.

Signature: Date:

ALEXANDER HARMON
Name: (print or type)

EXECUTIVE DIRECTOR
Title:

Institution Name and Address:

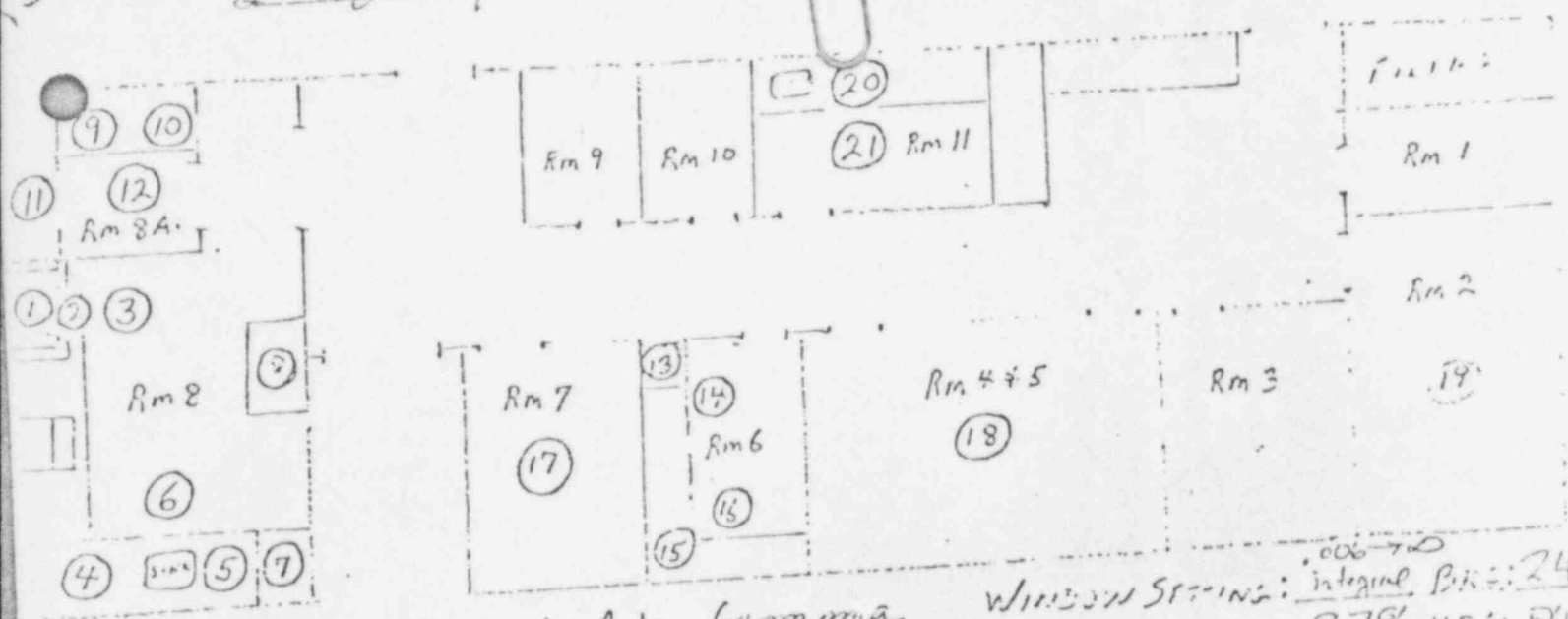
The Christ Hospital
2139 Auburn Avenue
Cincinnati, OH 45219

PROCEDURES AND PRECAUTIONS FOR USE OF RADIOACTIVE MATERIAL IN ANIMALS

Studies utilizing radioactive materials in animals will be conducted in Rooms 219 and 26 of the Gamble Research Institute. Radioactive materials are stored in a freezer in Room 219. The animals are injected in accordance with the general radiation safety rules such as gloves being worn, etc. The animals are sacrificed and tissue studies performed. Carcasses and other waste are placed in a labeled waste receptacle and the contents of this waste container are incinerated daily.

DATE: 4-17-80 SUPERVISOR: Wm. Kuyk

SURVEYOR: L. Mansfield RSO



INSTRUMENT USED: Packard Auto-Gamma WINDOW SETTING: .006-.20 Integral BKG: 247

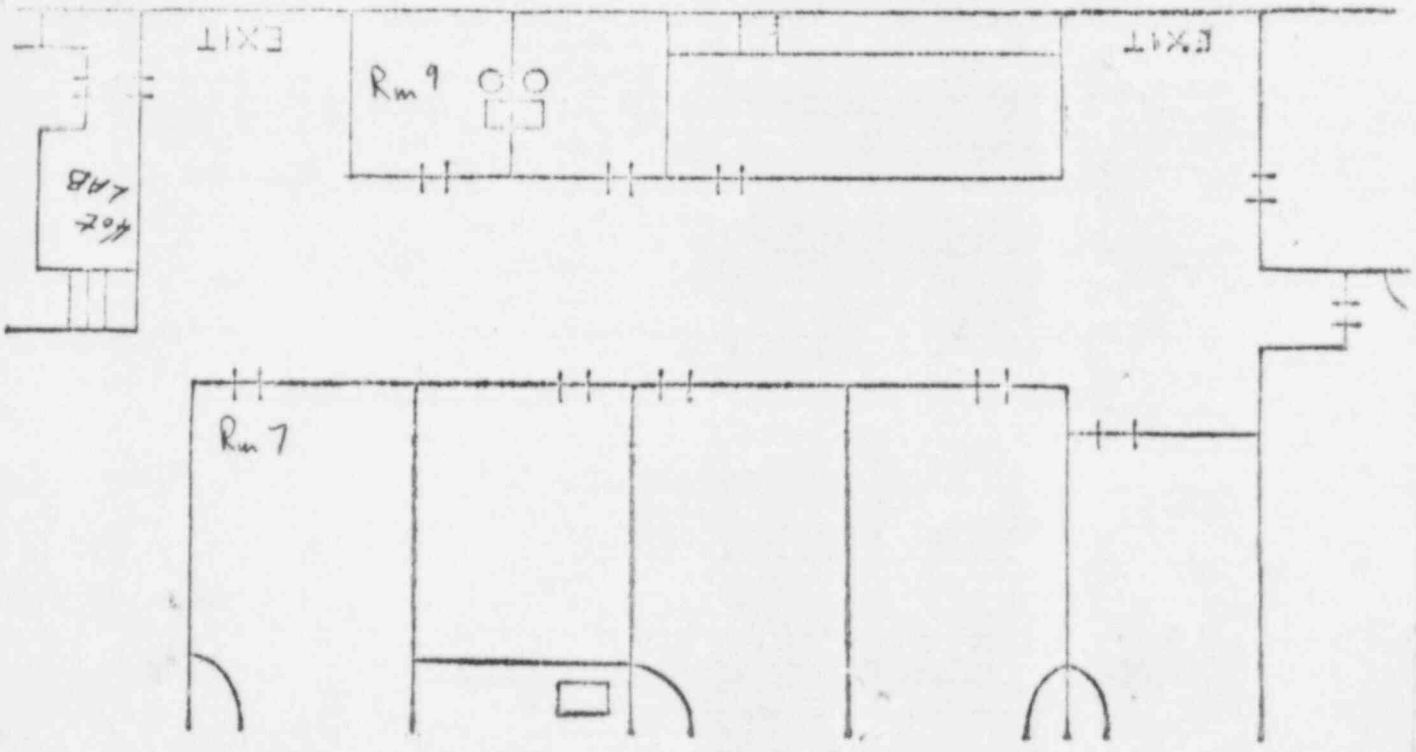
STANDARD SOURCE USED: ^{125}Sn .310 μCi CPM _____ EFF: 87% MDA: 5×10^{-7}

#	AREA	GROSS CPM	NET CPM	μCi	REMARKS
1	INSIDE CASTLE	302	55	2.85×10^{-5}	
2	COUNTER TOP	225	< BKG		
3	FLOOR	244	< BKG		
4	COUNTER TOP	217	< BKG	6.7×10^{-6}	
5	COUNTER TOP	260	13		
6	FLOOR	241	< BKG		
7	INSIDE REF.	234	< BKG		
8	CART	219	< BKG		
9	COUNTER TOP	220	66	3.42×10^{-5}	
10	INSIDE VAULT	313	5	2.59×10^{-6}	
11	SHELVES	252	< BKG		
12	FLOOR	238	27	1.40×10^{-5}	
13	RAD X CAL.	274	< BKG		
14	FLOOR	229	2	1.04×10^{-6}	
15	CENTRIFUGE	249	3	1.55×10^{-6}	
16	FLOOR	250	< BKG		
17	FLOOR	240	14	7.25×10^{-6}	
18	FLOOR	261	14	7.25×10^{-6}	
19	FLOOR	261	43	2.23×10^{-5}	
20	COUNTER TOP	290	< BKG		

HOT LAB SURVEY (DAILY)

AM			PM
4-18-80	10 mr/hr	COV 700 ✓	[illegible]
4-21-80	10 mr/hr	✓	32 mr/hr
4-22-80	10 mr/hr	✓	30 mr/hr
4-23-80	10 mr/hr	✓	30 mr/hr

End old location



FORM NRC-313M-SUPPLEMENT A
(8-78)

U.S. NUCLEAR REGULATORY COMMISSION

TRAINING AND EXPERIENCE
AUTHORIZED USER OR RADIATION SAFETY OFFICER

1. NAME OF AUTHORIZED USER OR RADIATION SAFETY OFFICER	2. STATE OR TERRITORY IN WHICH LICENSED TO PRACTICE MEDICINE
Kathryn Ann Weichert	Ohio

3. CERTIFICATION

SPECIALTY BOARD A	CATEGORY B	MONTH AND YEAR CERTIFIED C
American Board of Radiology	Therapeutic Radiology	June, 1976

4. TRAINING RECEIVED IN BASIC RADIOISOTOPE HANDLING TECHNIQUES

FIELD OF TRAINING A	LOCATION AND DATE(S) OF TRAINING B	TYPE AND LENGTH OF TRAINING	
		LECTURE/ LABORATORY COURSES *(Hours)* C	SUPERVISED LABORATORY EXPERIENCE *(Hours)* D
a. RADIATION PHYSICS AND INSTRUMENTATION			
b. RADIATION PROTECTION			
c. MATHEMATICS PERTAINING TO THE USE AND MEASUREMENT OF RADIOACTIVITY			
d. RADIATION BIOLOGY			
e. RADIOPHARMACEUTICAL CHEMISTRY			

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

ISOTOPE	MAXIMUM AMOUNT	WHERE EXPERIENCE WAS GAINED	DURATION OF EXPERIENCE	TYPE OF USE

PERSONNEL TRAINING PROGRAM

Annual radiation safety education will be provided for the Nuclear Medicine and Radiation Medicine Technologists as pertaining to their use of radioactive materials. The program is presented by the Radiation Safety Officer or delegate. Subjects pertaining to upgrading of nuclear medicine technology are given in addition to radiation safety for the Nuclear Medicine Department.

Periodicals and journals are subscribed to for the benefit of the personnel.

Inservice education will be given to other personnel in the hospital to include clerical, nursing, housekeeping and security personnel. Instructions will be given pertinent to their involvement with radioactive material procedures. The programs will be given on an annual basis before assuming duties within the vicinity of radioactive materials or whenever there is a significant change in any of our regulations or duties. For ancillary allied health personnel who are infrequently involved with radioactive material use, this education will be in the form of written instructions to department supervisors of Security, Receiving and Housekeeping who will instruct their involved personnel.

PROCEDURE FOR ORDERING AND RECEIVING RADIOACTIVE MATERIALS

1. Qualified personnel in Nuclear Medicine, Radiation Medicine, Laboratory Medicine and the Research Institute will order needed radioactive materials and will ensure that the requested materials and quantities are authorized by the license and that possession limits are not exceeded.

2. During normal working hours, carriers must be instructed to deliver radioactive packages directly to the receiving area. The receiving area in turn notifies the addressed department of its arrival. Radioactive materials to the Gamble Research Institute are delivered to the Institute loading dock and the carrier telephones the addressee to pick up the package.

3. During off-duty hours, security personnel must accept delivery of any packages containing radioactive material that arrive between 5:00 p.m. and 7:00 a.m. daily or Saturdays or Sundays. The packages must be signed for by the security officer on duty and taken immediately to the Nuclear Medicine Department. He will unlock the door, place the package on top of the counter immediately to the right of the door and relock the door.

4. If the package is wet or appears damaged, immediately contact the hospital Radiation Safety Officer. Ask the carrier to remain at the hospital until it can be determined that neither he nor the delivery vehicle is contaminated.

GENERAL RULES FOR SAFE USE OF RADIOACTIVE MATERIAL

1. Wear laboratory coats or other protective clothing at all times in areas where radioactive materials are used.

2. Wear disposable gloves at all times while handling radioactive materials.

3. Monitor hands and clothing for contamination after each procedure or before leaving the area in laboratories where greater than μCi levels of activity are utilized.

4. Always use syringe shields for routine preparation of patient doses and administration to patients, except in circumstances such as pediatric cases when their use would compromise the patient's well being. In these exceptional cases, use other protective methods such as remote delivery of the dose (e.g., through use of a butterfly valve).

5. a. Do not eat, drink, smoke or apply cosmetics in any area where radioactive material is stored or used.

   b. Do not store food, drink or personal effects with radioactive material.

6. a. Assay each patient dose in the dose calibrator prior to administration. Do not use any doses that differ from the prescribed dose by more than 10 percent.

   b. For therapeutic doses, also check the patient's name, the radionuclide, the chemical form and the activity versus the order written by the physician who will perform the procedure.

7. Wear personnel monitoring devices (film badge or TLD) at all times while in areas where radioactive materials are used or stored in greater than μCi amounts. These devices should be worn at chest or waist level. Personnel monitoring devices when not being worn to monitor occupational exposures should be stored in a designated low background area.

8. Wear TLD finger badges during elution of generator and preparation, assay and injection of radiopharmaceuticals where greater than μCi amounts of radioactive materials are utilized.

9. Dispose of radioactive waste only in specially designated and properly shielded receptacles.

10. Never pipette by mouth.

11. Survey generator, kit preparation and injection areas for contamination after each procedure or at the end of the day. Decontaminate if necessary.

12. Confine radioactive solutions in covered containers plainly identified and labeled with name of compound, radionuclide, date, activity and radiation level, if applicable.

13. Always transport radioactive material in shielded containers when greater than mCi amounts are utilized.

Item: 15, Revised 6/85

MEMORANDUM
Item 18

TO: Mr. Larry Blumfield

FROM: Mr. Edwin H. Hoeltke

DATE: June 10, 1983

RE: Christ Hospital Incinerator Effluent

Pursuant to our telephone conversation of June 6, 1983, I researched our files and found the information listed below as it relates to the effluent from the stacks of the existing incinerator and the new incinerator.

EXISTING INCINERATOR:

The effluent is discharged from the stack at approximately 1,600 degrees at a rate of 1,700 feet/minute with the total volume of 13,360 average cubic feet/minute.

NEW INCINERATOR:

The new incinerator is proposed to exit at the following rates:

Without the boiler 1,200 degrees Fahrenheit, 10,000 to 12,000 average cubic feet/minute at 1,800 feet/minute.

With the boiler in operation, the effluent would be at 400 degrees Fahrenheit with 4,000 to 5,000 average cubic feet/minute at a rate of 1,800 feet/minute.

In the case of the existing incinerator, it is operated approximately fourteen hours per day; and in the case of the new incinerator, we are anticipating operation of twenty to twenty-four hours per day.

Hopefully this provides you with sufficient information for your research program, and as you can see the new incinerator certainly does provide additional economies for The Christ Hospital. Please call if you have any additional questions.

Edwin H. Hoeltke
Assistant Administrator

Item 18

Calculations to determine the concentrations of ^{75}Selenium in air (soluble) under minimum daily incinerator operating conditions:

Minimum incinerator operating conditions:
(See attached memorandum dated June 10, 1983)

1. Minimum effluent discharge rate: 4×10^3 ft^3/min.
2. Minimum daily rate of incinerator operation: 20 hrs./day

Maximum number of animals used per week: 50

Maximum number of animals incinerated per week: 50

Expected isotopic dose per animal: 0.25 uCi ^{75}Se

Air concentration of soluble ^{75}Selenium as listed in 10 CFR 20, Appendix B, Table II, Column 1 which is the maximum allowable concentration of radioactivity in effluents which may be released to unrestricted areas per 10 CFR 20.106:

4×10^{-8} uCi/ml

Calculations:

a. $(4 \times 10^3 f^3/mn)(60\ mn/hr)(20\ hr/day)(2.8 \times 10^{-2}\ m^3/ft^3)(1 \times 10^6\ ml/m^3) = 1.3 \times 10^{11}$ ml/day

b. (10 animals/day)(0.25 uCi/animal) = 2.5 uCi/day

or (2.5 uCi/day)(5 day/week) = 12.5 uCi/week

c. $(2.5\ uCi/day)/(1.3 \times 10^{11}\ ml/day) = 1.9 \times 10^{-11}$ uCi/ml

or $(12.5\ uCi/day)/(1.3 \times 10^{11}\ ml/day) = 9.6 \times 10^{-11}$ uCi/ml

Therefore, even if all of the animal carcases used per week were incinerated in one day, the concentration of radioactivity of the incinerator effluent would still be significantly less than the maximum allowable concentration which may be released to unrestricted areas.

RESPONSE TO NRC INFORMATION REQUIRED FOR INCINERATION

Items 1,3,4: Addressed in original amendment proposal dated September 22, 1983.

Item 2: See Ed Hoeltke's memo, December 5, 1983 (attached).

Item 5: It is assumed that virtually all of the incinerated selenium-75 (as selenomethionine) will be discharged in the stack effluent. Because of the enormous volume of combustible material at The Christ Hospital, it is also assumed that the concentration of selenium-75 in residual ash will be well below the limit of 3×10^{-4} μCi/ml (water) as specified in Appendix B, Table II 10 CFR Part 20.

Measurement of ash samples will be performed to determine the exact concentration of selenium. The samples will be counted in a Packard Auto Gamma Scintillation Spectrometer which has been calibrated for selenium-75.

Item 6: See Ed Hoeltke's memo, December 5, 1983 (attached).

Item 7: Introduction of combustible animal tissue into the incinerator will be performed as soon as is reasonably achievable by the R.S.O., or his designee. The only individual likely to handle the residual ash is the operator indicated in item 6. This operator will be issued and instructed in the proper use of a dust respirator which will minimize the unlikely occurrence of overexposure due to dust inhalation. The operator will wear a work uniform and gloves which are laundered at The Christ Hospital. We believe these procedures to be adequate in preventing overexposure due to the exceedingly low concentrations expected in the ash.

Item 8: Enclosed is the evidence that state and local jurisdictions have been notified and that all state and local regulations concerning the incineration of radioactive material have been met by our institution.

Item 9: Maximum number of burns per week: 5
Maximum number of burns per year: 260

MEMORANDUM

TO: Mr. Lawrence Bloomfield
Radiation Safety Officer
Institute of Medical Research

FROM: Mr. Edwin H. Hoeltke
Assistant Administrator
The Christ Hospital

DATE: December 5, 1983

RE: Information Required - Nuclear Regulatory Commission

Following receipt of your memorandum on December 1, 1983, as it relates to the information required for the Nuclear Regulatory Commission licensing, I have gathered the following data. In response to the items listed in the material you furnished, I will indicate by item number my response.

Item 2. Characteristics of the incinerator include the following:

A. Height of stack - 25 feet above top of incinerator, approximately 35 feet above floor of operating room which is equivalent to ground level.

B. Height of adjacent buildings, ten floors above grade.

C. Distance from these buildings, closest building approximately 102 feet.

D. Proximity to air intakes, approximately 105 feet to the nearest intake which is a window air conditioning unit.

E. The rated air flow of the incinerator in cubic feet per hour or similar units is as follows: The rating of the incinerator is that it will discharge at the rate of 4,000 to 5,000 feet^3 per minute when the heat recovery unit is in operation. Without the heat recovery unit, it will exit at approximately 10,000 to 12,000 feet^3 per minute. The inside diameter of the stack is forty-eight inches, and these rates are calculated at a velocity of 1,800 feet per minute.

Item 6. Describe the procedures for handling and disposing of ash from the incinerator.

The handling and disposal of ash from this unit will be such which makes it nearly an automatic removal and storage system. The ash will be pushed from the bottom of the Incinerator grates into a collecting hopper built into a pit

December 5, 1983

RE: Information Required - Nuclear Regulatory Commission

below the floor of the operating building. The ashes will be removed from this pit by a pneumatic conveying system. The operator will pull the ashes to the intake on the ash removal system which constitutes the only manual operation.

The ash will then be transported by means of an eight inch suction line to an ash storage tipple where ashes from the adjacent coal fired boiler plant are stored. These ashes are then hauled from the property on a regular basis.

Additional Information:

1. Frequency of Stack Cleaning:
   The stack will be cleaned as appropriate but at least once/month.

2. Frequency of Ash Collection and Disposal will be every four hours from this unit which will be a twenty-four hour continuous operation and the ash will be removed from the storage tipple no less than once per week; and during heavy air conditioning and heating seasons, it will be removed twice per week.

Hopefully this information will be sufficient for you to procure your revision to your permit from the Nuclear Regulatory Commission, and I would encourage you to call if you have any additional questions. Thank you for following up on this matter and working with us as we attempt to incinerate any possible materials on site to avoid any other problems with disposition of waste at The Christ Hospital and the Institute of Medical Research.

Edwin H. Hoeltke
Assistant Administrator

cc G. Schiff
B. Simrall

February 7, 1984

Lawrence Bloomfield, R.S.O.
Christ Hospital Institute of Medical Research
2141 Auburn Avenue
Cincinnati, Ohio 45219

Dear Mr. Bloomfield:

Your application for disposal of radioactive material by incineration has been received and reviewed by our staff. Approval has been given to your application based on the information which you have provided us.

This information indicates that your institution will meet Department of Health requirements and standards concerning incineration of radioactive material.

We appreciate your cooperation in furnishing the information concerning your incineration plans.

Please notify this office if any changes or ammendments are made to your incineration operation in the future.

Sincerely,

Robert Quillin
Director, Radiological Health Program

City of Cincinnati

ANLEY E. BROADNAX, M.D., M.P.H.
COMMISSIONER OF HEALTH

DEPARTMENT OF HEALTH
3101 BURNET AVENUE
CINCINNATI, OHIO 45229

December 16, 1983

TO WHOM IT MAY CONCERN:

The registration form photocopied below was received by the Cincinnati Health Department on December 9, 1983. This fulfills the local requirement for registration of all radiation sources with the Health Department, for the materials and facility specified below.

Nadine B. Grady

Nadine B. Grady, R.S.
Senior Sanitarian
Professional Services Division

CITY OF CINCINNATI
BOARD OF HEALTH

Reg. No. _____

REGISTRATION OF A RADIATION INSTALLATION — OH-2

Each radiation producing device should be registered separately. Radionuclide users should register the installation indicating the maximum quantity of each radionuclide to be held in possession at any one time.

Christ Hospital Institute of Medical Research

c/o 1. Blomfield — Lawrence
Last Name — First Name

3 2141 Auburn Ave, Cinti., 45219
Address

5. Biomedical Research
Type of Activity or Specialization (Hospital, Industrial Research, Gyn., Radiology, General Practice, etc.)

2. Are you the owner ☐ yes ☒ no, if not give owner's name
Eliz. Gamble Deaconess Home Assn.

4. Type of Bldg. (Private home, office bldg., Hospital, etc.)
Hospital

6. Has equipment ever been inspected for safety ☑ yes ☐ no
1 Incinerator

7. Radioactive Materials generally on hand (except teletherapy units)
Check ☐ if none

Material	Maximum Amount at Any Time: Specify Amt. in Curies	Specify Amt. in Millicuries	Specify Amt. in Microcuries
Radium seeds			
Radium needles and/or Tubes			
Co-60 Applicators			
Thorium x-materials			
Others Selenium-75		3.0	

Equal Opportunity Employer