



THE CHRIST HOSPITAL / CINCINNATI, OHIO 45219

September 22, 1983

United States Nuclear Regulatory Commission, Region III
Materials Licensing Branch
799 Roosevelt Road
Glen Ellyn, Illinois 60137

Gentlemen:

I am writing to advise you that following the retirement of Alexander Harmon, I have been appointed to the position of Executive Director, with the full responsibilities of chief executive officer. This appointment was effective on May 11, 1983.

It is hereby requested that The Christ Hospital byproduct materials license (number 34-03831-02) be amended to include selenium-75 for non-human use. Documentation pertaining to this request is attached.

Please direct any requests for further information to the attention of Joseph L. Hall, Staff Medical Physicist, Department of Radiation Medicine.

As required by 10 CFR 170.13 Section 7.B, this amendment request is accompanied by a check for \$40.00.

Sincerely yours,

RECEIVED BY LFMB	
Date	10/3/83
Log	607, 217
By	cap
Orig. To	V/114
Action Compl.	cap

Applicant *The Christ Hosp Inst of* Jack M. Cook
Check No. *25089* Executive Director
Amount Fee Category *840 20*
Type of Fee *amend*
Date Check Rec'd *10/3/83*
Received By *cap*

8511180689 851008
REG3 LIC30
34-03831-02 PDR

Owned and Operated by THE ELIZABETH GAMBLE DEACONESS HOME ASSOCIATION

Control No. 75642

RECEIVED

SEP 28 1983

REGION III

SEP 28 1983

75
APPLICATION FOR INCLUSION OF ⁷⁵Se ON MATERIALS LICENSE

Background:

⁷⁵Se, as selenomethionine, will be used to label bacteria (F. aeruginosa). The labelled bacteria will be used to determine which alterations of the inflammatory and immune systems, induced as a result of burn injury, lower systemic host (guinea pig) resistance against bacterial infection. The technique of measurement of bacterial clearance by the reticuloendothelial system will be used to assess systemic host resistance and is fundamental to this project. ⁷⁵Se is the label of choice because it is readily incorporated and avoids scintillation quenching problems associated with assaying portions of test animal organs.

Usage:

⁷⁵Se/animal
Approximately 0.25 uCi
Maximum number of animals at any one time: 10
Maximum number of animals per week: 50
Maximum quantity of label on hand at any one time: 1.0 mCi

Safety and Monitoring:

⁷⁵Se
All work with ⁷⁵Se will be done in rooms 219 and 26 of The Christ Hospital Institute of Medical Research. The radioactive material will be stored in a freezer in room 219. All personnel working with ⁷⁵Se are knowledgeable in the handling of radioisotopes and wear film badges.

Due to the small quantities of radioactive material involved, wipe (smear test) surveys will be performed on a monthly basis as recommended in NRC Regulatory Guide 8-23. Meter surveys will be performed daily.

Disposal

Animal carcasses will be incinerated daily in the new incinerator at The Christ Hospital (incinerator effluent specifications enclosed).

Concentrations of ⁷⁵Se in air from incineration, even under minimum operating conditions, are significantly lower than those stated in 10 CFR, Part 20 (see enclosed calculation).

Dry waste will be disposed of by either of two methods: 1) Decay to background and disposal in regular trash, or 2) Burial at U.S. Ecology's Richland WA., facility

Calculations to determine the concentrations of ^{75}Se 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: $4 \times 10^3 \text{ ft}^3/\text{min}$.
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: $0.25 \text{ uCi } ^{75}\text{Se}$

Air concentration of soluble ^{75}Se 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:

$$4 \times 10^{-8} \text{ uCi/ml}$$

Calculations:

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

b. $(10 \text{ animals/day})(0.25 \text{ uCi/animal}) = 2.5 \text{ uCi/day}$

or $(2.5 \text{ uCi/day})(5 \text{ day/week}) = 12.5 \text{ uCi/week}$

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

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

Therefore, even if all of the animal carcasses 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.

MEMORANDUM

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

 ***** INCINERATOR EFFLUENCE *****

USER NAME : JOHN MADERA
 TODAY'S DATE : 06-27-1985
 CURRENT TIME : 15:31:48
 LICENSEE : THE CHRIST HOSPITAL
 FACILITY ADDRESS : CINCINNATI, OHIO
 LICENSE NUMBER :
 INCINERATOR :

EFFLUENT GAS TEMPERATURE : 478 DEGREES KELVIN
 AMBIENT AIR TEMPERATURE : 289 DEGREES KELVIN
 GAS EXIT VELOCITY : 9.2 METERS/SECOND
 STACK DIAMETER : 1.2 METERS
 STACK HEIGHT : 10.7 METERS
 EFFECTIVE STACK HEIGHT : 23.1 METERS
 DOWNWIND DISTANCE (X) : 31.1 METERS
 CROSSWIND DISTANCE (Y) : 0.0 METERS
 HEIGHT (Z) : 30.5 METERS
 AVERAGE WIND SPEED : 2.2 METERS/SECOND
 STABILITY CLASS : D

ISOTOPE	MAXIMUM PERMISSIBLE CONCENTRATION	MAXIMUM PERMISSIBLE EMISSION RATE	
	(MICROCURIES/MILLILITER)	(MICROCURIES/DAY)	(MICROCURIES/YEAR)
SELENIUM-75	4E-08	7E+09	3E+12

 ***** INCINERATOR EFFLUENCE *****

USER NAME : JOHN MADERA
 TODAY'S DATE : 06-27-1985
 CURRENT TIME : 15:35:13
 LICENSEE : THE CHRIST HOSPITAL
 FACILITY ADDRESS : CINCINNATI, OHIO
 LICENSE NUMBER :
 INCINERATOR :

EFFLUENT GAS TEMPERATURE : 478 DEGREES KELVIN
 AMBIENT AIR TEMPERATURE : 289 DEGREES KELVIN
 GAS EXIT VELOCITY : 9.2 METERS/SECOND
 STACK DIAMETER : 1.2 METERS
 STACK HEIGHT : 10.7 METERS
 EFFECTIVE STACK HEIGHT : 23.1 METERS
 DOWNWIND DISTANCE (X) : 31.1 METERS
 CROSSWIND DISTANCE (Y) : 0.0 METERS
 HEIGHT (Z) : 30.5 METERS
 AVERAGE WIND SPEED : 2.2 METERS/SECOND
 STABILITY CLASS : D

ISOTOPE	EMISSION RATE (MICROCURIES/SECOND)	EMISSION RATE (MICROCURIES/DAY)	EFFLUENT CONCENTRATION IN AIR (MICROCURIES/MILLILITER)
SELENIUM-75	8E+04	7E+09	4E-08