



DELNOR HOSPITAL

975 North Fifth Avenue / St. Charles, Illinois 60174 / (312) 584-3300

March 9, 1982

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

Control No. 09305

Attn: Bruce S. Mallet, PhD., Section Leader

Re: Your letter dated January 13, 1982 to amend our NRC License #12-15842-01

Gentlemen:

In order to complete your review, please see additional information on the following points:

- 1) A. We will measure the air/flow rates in the ventilation systems for Xenon-133 at least semi-annually, to determine that the system meets the specifications and record them.

B. Please refer to attached calculations which demonstrate the necessity for a negative flow rate of 101 CFM. Our ventilation system has been modified and the Input is now 215 CFM, and the exhaust rate is 330 CFM. Our present negative flow rate is 115 CFM, therefore, the negative flow rate is greater than 101 CFM.
- 2) In reference to your statement:
Re: Close out survey - please see attached survey report. We are requesting unrestricted use of this area, since our physicist has demonstrated there is no significant contamination.
- 3) Re: ALARA program: Please note enclosed ALARA concept program which has been approved by our RSO and hospital management.

Sincerely,

Alvin A. Zeman, M.D.
Chief Radiologist

8506190069 850604
REG3 LIC30
12-15842-01 PDR

- Enc: 1. Calculations for negative flow rate
2. Close Out Survey
3. ALARA Program

MAR 11 1982

Xe¹³³ Use

Imaging Room Ventilation

Activity/Week

Four (4) patients/week X 10 mCi/patient X 10^3 uCi/mCi X .22
(22%) Xe released = 8.8×10^3 uCi/week.

Activity/Year

8.8×10^3 uCi/week X 52 wks/year = 4.58×10^5 uCi/year

Air flow needed for release to unrestricted area in order to
be less than 3×10^{-7} uCi/ml is:

$$\frac{4.58 \times 10^5 \text{ uCi/year}}{3 \times 10^{-7} \text{ uCi/ml}} = 1.5 \times 10^{12} \text{ ml/year}$$

$$\frac{1.5 \times 10^{12} \text{ ml/year} \times 1 \text{ CFM}}{1.484 \times 10^{10} \text{ ml/year}} = 1.01 \times 10^2 \text{ CFM} \quad (101 \text{ CFM})$$


Conversion factors from NRC licensing guide used were:

$$1 \text{ CFM} = 6.8 \times 10^7 \text{ ml/week}$$

$$1 \text{ CFM} = 1.48 \times 10^{10} \text{ ml/year}$$

Conclusion - An Air Flow rate (negative) required is 101 CFM.

Nicholas Lembares


(Board Certified Physicist)

PROFESSIONAL RADIATION MANAGEMENT INC.

5213 WEST LAWRENCE AVE.
CHICAGO, ILLINOIS 60630
TELEPHONE (312) 282-1689

RADIATION SURVEY REPORT

Performed For: Delnor Hospital
St. Charles, IL

Date Performed: January 21, 1982

Area Surveyed: Room used for Nuclear Imaging

Purpose of Survey: To permit room to be released for unrestricted use.


Method of Survey: Room was surveyed using an Eberline E 500 B with an end window detector and wipe tests of numerous areas made. Wipes were analyzed with a calibrated multichannel Gamma Spectrometer using a two (2) inch NaI (Tl) crystal. Each represents 100 Cm².

Analysis: Background - 90 cts/40 sec - Blank Wipe 91 cts/40 sec

| | Gross | Net | Activity |
|---------------------------|-------|------|------------------------------------|
| Floor (N) | 88 | 0 | Less Than 5 X 10 ⁻⁷ uCi |
| Floor (M) | 91 | 1 | Less Than 5 X 10 ⁻⁷ uCi |
| Floor (S) | 96 | 6 | Less Than 3 X 10 ⁻⁶ uCi |
| Wall (E) | 87 | 0 | Less Than 5 X 10 ⁻⁷ uCi |
| Wall (S) | 91 | 1 | Less Than 5 X 10 ⁻⁷ uCi |
| Wall (W) | 86 | 0 | Less Than 5 X 10 ⁻⁷ uCi |
| Wall (N) | 89 | 0 | Less Than 5 X 10 ⁻⁷ uCi |
| Exhaust Vent | 92 | 2 | Less Than 1 X 10 ⁻⁶ uCi |
| Intake Vent | 90 | 0 | Less Than 5 X 10 ⁻⁷ uCi |
| Light Fixture | 88 | 0 | Less Than 5 X 10 ⁻⁷ uCi |
| Desk | 92 | 2 | Less Than 1 X 10 ⁻⁶ uCi |
| Imaging Table | 96 | 6 | Less Than 3 X 10 ⁻⁶ uCi |
| Cabinet | 88 | 0 | Less Than 5 X 10 ⁻⁷ uCi |
| Chair | 89 | 0 | Less Than 5 X 10 ⁻⁷ uCi |
| Co ⁵⁷ Standard | 7867 | 7777 | 0.0036 uCi |

Survey Results: No counts above normal background were noted with survey instrument. Wipe test results of exhaust vent, intake vent, fluorescent light fixtures, floor, desk, filing cabinet, chair, imaging table and wall areas all indicated no significant radioactivity.

CONCLUSION: Room and fixtures are not contaminated by radioactive material.


James Peterson
Radiation Consultant

JP/ba

ALARA CONCEPT PROGRAM

Delnor Hospital
St. Charles, IL

NRC License No. 12-15842-C1

Date: February 4, 1982

I. Commitment

- A. This institution is hereby committed to the ALARA concept of reducing occupational radiation exposure to personnel (individual and collective) to the lowest possible levels.
- B. The commitment will involve the following:
 - 1. Management participation.
 - 2. Formation of a Radiation Safety Committee*
 - 3. Development of policies and procedures to promulgate an effective ALARA program.
 - 4. A formal audit program to be conducted on a semi-regular basis to review operating procedures, exposure records, etc.
 - 5. Involve all individuals - RSO, users and workers in the development and continuing review of the ALARA program.
 - 6. Modification to equipment and facilities as needed and when practicable at reasonable costs to comply with ALARA.
 - 7. Doses to individuals as well as the sum exposure dose to the total individuals involved will be reduced.
 - 8. Regulatory guides 8.10 and 8.18 will be used to develop the ALARA program.

*The members of the Radiation Safety Committee (RSO) are listed at the back of this document.

II. Radiation Safety Committee

- A. Review of Proposed Users and Uses-
 - 1. Qualifications of each authorized user and potential user will be reviewed as to type and quantity of materials to be used.
 - 2. Each user will be reviewed as to adherence to the ALARA concept.
 - 3. Users will justify their procedure to comply with the ALARA program.

B. RSC Authority-

1. The RSO will have full authority for implementation and enforcement of the ALARA program.
 2. The RSC will support the RSO in all instances. Should there be a difference of opinion, the RSO will record the reasons for its action.
- C. The RSC and management will perform a semi-annual review of the radiation safety programs and ALARA concept compliance.
- D. The RSC will review all instances of variation from the ALARA program. The RSO will normally prepare the report of the investigation.
- E. RSC in its review will evaluate the participation of all individuals and departments involved in the ALARA program, RSO, users, management, etc.
- F. The RSO will be responsible to see that all radiation workers and any other involved personnel are made aware of the ALARA program and the commitment to the concept.

III. Radiation Safety Officer (RSO)

- A. The RSO will conduct a monthly review of all personnel exposure reports to see that the ALARA program is being practiced.
- B. The RSO will review at quarterly intervals his own ALARA program as well as establishment of any new policy or procedure to the ALARA concept.
- C. Periodic radiation surveys will be conducted of unrestricted and restricted areas as well as effluents released to determine if they are ALARA.
- D. The RSO will conduct a training session on the ALARA program to all involved individuals and conduct periodic sessions for review or establishment of new procedures.
- E. The RSO will elicit the comments and suggestions of all individuals involved in the ALARA program as to improvements or changes to the program.
- F. The RSO will be responsible for the investigation of all incidents which involve any changes from established ALARA practices.
- G. All instances of individual exposures which exceed the established levels of ALARA exposure will be promptly investigated by the RSO and documented as to why and corrective measures.

IV. Authorized Users

- A. Users will consult the RSO or RSC before using any new materials or establishing a new procedure.
- B. All uses of material must comply with the ALARA program.
- C. The user will be thoroughly familiar with the ALARA program and explain such to all employees he is responsible for.
- D. The user will continually review his program to comply with the ALARA concept.
- E. The RSO, user and employees will work together for a constant commitment to ALARA concepts.

V. Occupational Workers

- A. All workers will be familiar with the ALARA concept.
- B. The occupational worker will feel free to contact the USER or RSO if he (she) feels that the ALARA policies are not optional and with suggestions for improvement.
- C. The occupational worker will be responsible for practicing the ALARA policies and procedures and being aware that fellow workers have the same responsibility.

VI. Action Levels for Individual Exposures

- A. Our action level for Nuclear Medicine personnel will be a maximum limit of 10% of the MPD. Action to be taken when the action level is exceeded in the following:
 - 1. RSO investigate and establish reasons why the level was exceeded.
 - 2. Report and recommendation kept on file with RSO.
 - 3. If same individual or same department exceeds action level more than three (3) times in one year or the maximum level is exceeded at all the RSO, investigational reports and recommendations are presented to the RSC for review and action to be taken on the situation.

This hospital is committed to the ALARA Program as set forth above.

Management

John A. [Signature]
(Signature)
PRESIDENT
(Title)

RSO

Ann A. [Signature]
(Signature)
Director of Radiology
(Title)

ALARA PROGRAM

1. Jim Howard - Department of Safety
2. John A. Taft, J.. - President
3. Shirley Smith - Director of Nursing
4. Alvin A. Zeman, M.D. - Radiation Safety Officer
5. Ted Tomlin - Occupational Worker
6. Judy Meyers - Technical Director