NRC FORM 35
U.S. NUCLEAR REGULATORY COMMISSION
Expires 12/31/85

# APPLICATION FOR MATERIALS LICENSE – TELETHERAPY

INSTRUCTIONS – Complete Items 1 through 22 if this is an initial application or an application for renewal of a license. Use supplemental sheets where necessary. Item 22 must be completed on all applications and signed. Retain one copy. Submit original and one copy of entire application to: Director, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555. Upon approval of this application, the applicant will receive a Materials License. An NRC Materials 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, Parts 19, 20, 21, and 35 and the license fee provision of Title 10, Code of Federal Regulations, Part 170. The license fee category should be stated in Item 22 and the appropriate fee enclosed.

1.a. NAME AND MAILING ADDRESS OF APPLICANT (Institution, firm, clinic, physician, etc.) INCLUDE ZIP CODE

Allegheny Health Education & Research Corp.
320 East North Avenue
Pittsburgh, PA 15212

1.b. STREET ADDRESS(ES), ACTUAL LOCATION OF TELETHERAPY SOURCE, INCLUDING BUILDING NAME, ROOM NUMBER, ETC.

Same

TELEPHONE AREA CODE ( 412) NUMBER 359-3131

2. PERSON TO CONTACT REGARDING THIS APPLICATION

Frank P. Ottino, M.Sc.

TELEPHONE AREA CODE ( 412) NUMBER 359-3485

3. THIS IS AN APPLICATION FOR: (Check appropriate item)

- [ ] a. NEW LICENSE
- [ ] b. AMENDMENT TO LICENSE NO. _____
- [X] c. RENEWAL OF LICENSE NO. 37-01317-02

4. INDIVIDUAL USERS (Name individuals who will use or directly supervise use of radioactive material. Complete Supplements A and B for each individual.)

Prabha Bansal, M.D.; Human Use
Frank P. Ottino, M.Sc.; Non-Human Use
Roy E. Summers, M.Sc.; Non-Human Use
Prakash Shrivastava, Ph.D.; Non-Human Use

5. RADIATION SAFETY OFFICER (RSO) (Name of person designated as radiation safety officer. If other than individual user, complete resume of training and experience as in Supplement A.)

Frank P. Ottino, M.Sc.

6. SEALED SOURCES TO BE USED IN TELETHERAPY UNITS (Attach supplemental pages if necessary)

| | BYPRODUCT MATERIAL (Element and Mass No.) | NAME OF SOURCE MANUFACTURER | SOURCE MODEL NUMBER | MAXIMUM ACTIVITY PER SOURCE | NUMBER OF SOURCES |
|---|---|---|---|---|---|
| A. | Co-60 | Teletherapy, Picker Advanced Medical Systems, Inc. | P-3802 A/AMS-3802 | 6,500 Curies | 2x |
| B. | Co-60 | Teletherapy A.E.C.L. | C-146 or C-151 | 2,200 Curies | 2x |
| C. | | | | | |

7. TELETHERAPY UNITS (Attach supplemental pages, if necessary)

| | NAME OF MANUFACTURER (Include description, if unit is custom made) | MODEL NUMBER |
|---|---|---|
| A. | Picker Corporation | 6296 (C9M/80) |
| B. | A.E.C.L. | Eldorado Super G |
| C. | | |

8. USE (Attach supplementary pages, if necessary)

| A | B | C | |
|---|---|---|---|
| X | | | HUMAN USE ONLY |
| | X | | HUMAN AND OTHER USE (Specify on separate sheet) |

B. is to be used for non-human uses as a calibration source located in our Accredited Dosimetry Calibration Laboratory

9. PERSONNEL MONITORING DEVICES

| | TYPE (Check and/or complete as appropriate) | SUPPLIER (Service Company) | EXCHANGE FREQUENCY |
|---|---|---|---|
| | (1) FILM BADGE - WHOLE BODY | | |
| X | (2) THERMOLUMINESCENT DOSIMETER (TLD) - WHOLE BODY | R.S. Landauer, Jr. & Company | Monthly |
| X | (3) OTHER (Specify) TLD Ring Extremity Dosimeters | R. S. Landauer, Jr. & Company | Monthly |



License Fee Information on Next Page

INFORMATION REQUIRED FOR ITEMS 10 THROUGH 21

For Items 10 through 21, check the appropriate box(es) and submit a detailed description of all the requested information. Begin each item on a separate sheet. Identify the item number and the date of the application in the lower right corner of each page. If you indicate that an appendix to the referenced licensing guide will be followed, do not submit the pages, but specify the revision number and date of the referenced guide. Regulatory Guide 10 Rev. _____ Date _____

| | | | |
|---|---|---|---|
| 10. MEDICAL ISOTOPE COMMITTEE | | 15. BEAM STOPS | |
| X | Names and specialties attached, and *(check one)* | X | Description of stops used to restrict beam orientation attached. |
| X | a. Duties as in Appendix A, or | 16. SHIELDING EVALUATION | |
| | b. Equivalent duties attached. | | Evaluation of proposed shielding attached. |
| 11. TRAINING AND EXPERIENCE | | 17. OPERATING AND EMERGENCY PROCEDURES | |
| | a. Supplements A & B attached for each individual user, and | X | a. Description of operating procedures attached, and |
| | b. Supplement A attached for RSO. | X | b. Copy of emergency procedures attached. |
| 12. INSTRUMENTATION *(check one)* | | 18. INSTRUCTION OF PERSONNEL *(check one)* | |
| | a. Appendix C form attached, or | X | a. Training program and schedule in Appendix H followed, or |
| X | b. List manufacturer's name and model number. | | b. Description of instruction program for employees attached. |
| 13. CALIBRATION OF INSTRUMENTS *(check one)* | | 19. LEAK TESTS OF SEALED SOURCES | |
| X | a. Appendix D, Part 2 procedures followed for instrumentation calibration, or | X | Description of leak test procedures attached. |
| | b. Description of sources, calibration frequency and equivalent procedures attached. | 20. QUALIFIED EXPERT *(Use only if the individual fails to meet 10 CFR 35.20 requirements.)* | |
| 14. FACILITIES AND EQUIPMENT | | | Statement of qualifications of the expert who will perform teletherapy calibrations attached. |
| | a. Description and drawing of facilities attached, and | 21. ALARA PROGRAM *(check one)* | |
| X | b. Description of patient viewing and communicating systems attached, and | X | ALARA Program as in Appendix I, or |
| | c. Description of area safeguards attached. | | Equivalent ALARA Program attached. |

22. CERTIFICATE

*(This item must be completed by the applicant)*

The applicant and any official executing this certificate on behalf of the applicant named in Item 1a certifies that this application is prepared in conformity with Title 10, Code of Federal Regulations, Parts 30 and 35, and that all information contained herein, including supplements attached hereto, is true and correct to the best of our knowledge and belief.

a. LICENSE FEE REQUIRED *(See section 170.31, 10 CFR 170)*

10-CFR-170.31 (7A)

(1) LICENSE FEE CATEGORY

$350.00

(2) LICENSE FEE ENCLOSED

$

b. APPLICANT OR CERTIFYING OFFICIAL'S SIGNATURE

John H Westerman

(1) NAME *(Type or print)*

John H. Westerman

(2) TITLE

President

c. DATE

July 30, 1984

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.

License Fee Information on Next Page

Item 10: Radiation Safety Committee

As of July 7, 1984, the membership of the Radiation Safety Committee and their respective departments are as follows:

| | |
|---|---|
| Oscar M. Powell,M.D., Chairman | Nuclear Medicine |
| Mustafa H. Adatepe, M.D. | Nuclear Medicine |
| Farhad Contractor, M.D. | Diagnostic Radiology |
| Nilima Dash, M.D. | Diagnostic Radiology |
| Joseph DeFrancesco, D.M.D. | Oral & Maxillofacial Surgery |
| David W. Hayeslip, M.D. | Clinical Pathology |
| Christopher V. Lamperski,M.D. | General Medicine |
| Raymond N. Cefola, M.Sc. | Nuclear Medicine |
| Frank P. Ottino, M.Sc. | Radiation Protection |
| Fred M. Rankin, III | Administration |
| Lawrence Sukay | Risk Management |
| Roy E. Summers, M.Sc. | Radiation Oncology |
| Mary Tobias, R.N. | Nursing |
| Melissa Dunning | Administration |

RECEIVED BY LFMB
Date 8/7/84
Log Aug-4 I
By Jacques
Orig. To
Action Compl. 8/8/84

Applicant
Check No. 808444
Amount/Fee Category $350 7A
Type of Fee Renewal
Date Check Rec'd 8/7/84
Received By Jacques

Item 11: Training and Experience

As evidence of Dr. Bansal, Dr. Shrivastava, Mr. Summers, and Mr. Ottino's training and experience please note that these individuals are current authorized users on license 37-01317-02. Please delete Dr. Julian Proctor as an authorized user.

Item 11
7/26/84

Item 12: Instrumentation

Portable Instrumentation

1. Victoreen Instruments, Corp. Model 470-A
   0-3 mR/hr 0-1000 R/hr

2. Victoreen Instrument, Corp. Model 490-5
   0-0.2 mR/hr 0-20 mR/hr

3. Texas Nuclear Corp. Model TN2597
   0-10 mR/hr 0-1000 mR/hr

4. Eberline Corp. Model PRM-4
   Lin Log scale 0-5 kcpm 0-500 kcpm

5. Victoreen Instruments, Corp. Model 740 D
   0-25 mR/hr 0-2500 mR/hr

6. Eberline Corp. Model PAC-3G
   0-1000 cpm 0-10,000 cpm
   (alpha & beta probes) - gas flow proportional counter

7. Victoreen Instruments Corp. Model 570
   Condensor R meters

8. Capintec Instruments Corp. Models 192, 192X, 192AX
   Electrometer (4x)

9. Keithley Instruments, Inc. Model 616
   Digital Electrometer

10. Nuclear Associates/Victoreen, Inc. Model Minimonitor II
    0-10 mR/hr 0-1000 mR/hr

11. Dosimeter Corp. Model SuperDAD Cat. #1888
    Digital Personnel Dosimeter

12. Nuclear Associates/Victoreen Model 541R
    Direct Reading Pocket Chambers (3x)

13. Dosimeter Corp. Model 862
    Direct Reading Pocket Chambers (3x)

14. Eberline Corp. Model SPI-2,
    Source Position Indicator (3x)

15. Eberline Corp. Model E-530
    0-0.2 mR/hr 0-200 mR/hr

Non-Portable

1. Nuclear Measurements Corp. Model DS-3 Scaler & PCC-11 TC Chamber; Windowless Gas Flow Proportional Counter

2. Packard Corporation Models 3390, 3380, 3002,3390,460CD Tricarb Liquid Scintillation Spectrometers (5 Total)

3. Packard Corporation - Models 578
PGD Auto Gamma
Gamma Scintillation Spectrometer

Item 14b. Facilities and Equipment

The primary means of observing the patient during treatment is by means of a closed circuit television system and intercom. The television monitor is located in the desk on which the console (unit control panel) rests, so it is possible for the operator to watch both the console and patient (via the monitor) from the same position. In the event of a malfunction of the CCTV, a back-up observation system consists of a mirror/window arrangement: by looking through a (leaded glass) window in the access door, the operator can see the image of the room and patient in a mirror mounted on the wall of the treatment room.

Item 15: Beam Stops

There exist electrical and mechanical beam stops which are operational and restrict beam orientation, but the presence and utilization of these beam stops do not influence radiation levels in the restricted or unrestricted areas surrounding the teletherapy unit. Beam stops are not necessary to prevent excessive (10-CFR-20.105)radiation exposure levels to the adjoining areas.

From its usual alignment of the integral beam stop, the head can be swiveled to its yoke 24° to the front (where it is stopped by the physical contact of the head with the yoke) and 14° toward the back (where it is stopped by electrical power interruption to the drive motor). It is not possible to aim the primary beam parallel to the axis of rotation of the unit. The head can be rotated about its yoke on an axis perpendicular to the unit axis of rotation through 150° in each direction. It is thus possible to direct the useful beam completely away from the integral beam absorber. Rotation about the yoke axis is stopped at $\pm$150° by electrical power interruption to the drive motors.

Item 17: Operating and Emergency Procedures

A. Operating Procedures

1. Attached are found the Cobalt-60 Warm up Procedures. Note that there exists two such procedures; a daily protocol and a weekly protocol with the associated checklist recording table. Also attached is a description of the Eberline SPI-2 source position indicator.

2. Personnel Dosimetry: See attached descriptions and procedures for dosimetry, entitled "Review of Radiation Dosimeter Procedures and Descriptions of New Badges", 7/20/83, and "ALARA Program Action Level Notification".

3. Radiation Safety Procedures: Attached are the Cobalt-60 Teletherapy Radiation Safety Procedure. (See attached procedure).

B. Emergency Procedures

See Attached Emergency Procedures

Cobalt-60 Procedures
Daily Procedures

1. Use the log sheet for daily and weekly checks. If any equipment is not operating notify supervisor and appropriate engineers for repairs.

2. Check back pointer with field center at 95 SSD. Adjust if necessary.

3. Verify collimator and light field agree by using 10 x 10 cm graph paper. If greater than 2 mm error notify Physics Staff.

4. Visually inspect console beam status lights (red & green). If out notify Dave Borelli by paging him.

5. Visually inspect zone guard lights in both on and off positions.

6. Visually inspect SPI-2 monitor in on-off position both AC and battery mode. If not operating notify Frank P. Ottino by paging him or calling Ext. 3485.

7. With machine in on position check door interlock system. If not operating notify Radiation Protection immediately.

Item 17 A.
7/26/84

Cobalt-60 Warm-up
Weekly Procedures

Every Monday in addition to the daily checks, four additional checks are to be performed.

A. Radiation Field vs. Light Field Coincidence

1. Place the gantry at zero degrees.

2. Adjust the collimators to 15 cm x 15 cm according to collimator scales.

3. Place a redi-pack film XV on the tabletop.

4. Using the optical distance indicator, adjust the table top height to 80 SSD.

5. Using the field light, center the film pack approximately to the center of the field.

6. Tape the edges of the film pack to the table top.

7. Measure the size of projected light field and compare with the indicator readout, and record.

8. With a pin, puncture the four corners of the light field. For future orientation place a puncture in upper right corner of the film and write appropriate information on redi-pack jacket, i.e, date, machine collimator angle, direction of gantry, left and right direction as looking toward gantry.

9. Place a sheet of build-up material over the film pack.

10. Leave the room, close the door and expose the film to approximately 25 Rads.

11. Develop the film.

12. Analyze visually the coincidence of the light field marks and the edge of the radiation field. Remember that the light field markers will be in the penumbra region of the radiation field.

13. Show film to physics staff and file in jacket.

B. AP-PA Coincidence Split Field Test

1. Set the gantry to the upright position and the field size to 10 cm to 10 cm.

2. Place a sheet of build-up material over the grid and tape a film (redi-pack XV) on the sheet. Mark it so right, left and gantry sides can be identified. Place a sheet of build-up material over the film pack and set to 81.0 cm SSD.

3. Put blocking tray in position and place a standard shielding block diagonally across the film.

4. Expose the film with the gantry in the upright position. Use 25 rad with XV film.

5. Remove block and tray and rotate the gantry 180 degrees. Position tray and place shielding block completely covering the unblocked areas of the AP exposure.

6. Expose the film using the same techniques.

7. Process the film. If edges show displacement of the portions irradiated by the two exposure, measure how much the field edges are displaced.

8. If displacement is greater than 0.5 cm check with physics before using machine for patient treatment. If displacement is 0.5 cm or less use machine for treatment, show film to physics staff and file in jacket.

C. Distance Stick vs. ODI

1. Obtain plastic distance stick from metal cabinet in Cobalt-60 room.

2. Place distance stick into position by placing the upper part of the "T" against the base of the collimator housing.

3. Raise the table until the tip of the stick touches the table.

4. Place a piece of paper on the table and obtain the reading from the optical distance indicator.

5. Record the value obtained.

6. If greater than 3 mm notify Physics Staff.

D. Collimator Rotation Check

1. Set gantry and collimator in standard positions.

2. Place a piece of paper with a dot on it on the table.

3. Place the dot so that it is under the center of the cross hairs.

4. Rotate the collimator to see if the center of the cross hairs deviate from the dot.

5. Record if okay, if diviation occurs greater than 2 mm, record and notify Physics Staff.

## Cobalt 60 Daily Check

## Cobalt-60 Weekly Check

| Date | Initials | Door Interlock | Battery Check ON | Battery Check OFF | Back-Pointer Check | Collimator Indicator vs. Light Field | SPI-25 Beam Monitor Check ON | SPI-25 Beam Monitor Check OFF | Console Lights | Zone Guard ON | Zone Guard OFF | Radiation Field vs. Light Field AP/PA | Symmetry Split-Field Test | ODI Check | Collimator Rotation Check |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
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Item 17A
7/26/84

TO CHECK ADJUSTMENT OF VERIFICATION LIGHTS

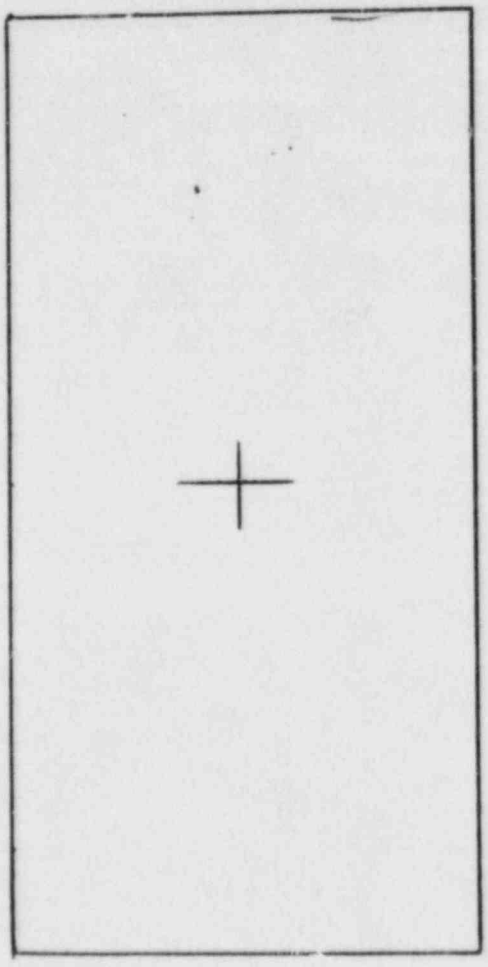
1. Take the pattern below and tape on table near isocenter.

2. Place styrofoam block on tray and carefully trace the pattern and cut the block out accordingly. Let center piece of block fall out.

3. Turn off the viewing light. (Also be sure the cutting wire is turned off!) You may also want room lights turned off in order to see verification light a little bit better.

4. Turn verification light switch on. Now **pull** the cord to activate verification light. The shadow should line up with the outline drawing on the paper when the carriage is all the way forward against the front stop.

5. If the patterns do not line-up call Debbie or Barb to make adjustments.



Item 17A
7/26/84

# EBERLINE SPI-2

## SOURCE POSITION INDICATOR

In order to be able to rely on the Eberline Model SPI-2 (Source Position Indicator) a daily "operation check" must be conducted. The monitor operates from a normal (AC) wall electrical outlet. The unit also has a power failure back-up battery which provides reliable radiation indication for several hours (up to 4 hrs. on fully charged batteries).

For the therapy technologist's maximum radiation safety it is important that he/she knows what the various flashing lamps indicate, and whether the back-up batteries are charged and functioning.

### FUNCTIONS OF THE SPI-2

1. Double row of flashing green lamps indicates the source is not exposed.

2. Double row of flashing red lamps indicates the source is exposed.

3. The single red lamp centrally located between the red and green flashing indicating lamps will come on with a steady red light warning a possible failure (actually indicates that voltage pulses are being received below a preset frequency).

4. Lack of all lights indicates a complete instrument malfunction.

A daily SPI-2 check with associated logging should be conducted.

**ALLEGHENY GENERAL HOSPITAL**
**DEPARTMENTAL CORRESPONDENCE**

DATE July 20, 1983

FROM Frank P. Ottino, M.Sc. DEPT. Radiation Protection

SUBJECT Review of Radiation Dosimeter Procedures and Description of New Badges

TO DEPT.

The current radiation exposure monitoring program utilizing radiation detection badges (dosimeters) is being completely up-graded in terms of badge type and subsequent exposure reporting. This memorandum is issued to review the responsibilities of the radiation badge user and the Radiation Protection Office as they are associated with proper use of these badges and subsequent reporting.

I The New Radiation Badge (Dosimeter)

As of July 10, 1983, all radiation workers will have received a radiation badge (dosimeter) which is different from the existing dosimeter being used. These new dosimeters detect radiation through the use of small radiosensitive chips rather than the film packet with which we are currently familiar. Thus the initial difference is that in the past you had to open the dosimeter's case to change the monthly film packet, you now will have to simply exchange the entire badge when the exchange of new dosimeters for old dosimeters occurs. Also you will notice with successive dosimeter changes the color of the dosimeter will also change. This will allow each dosimeter user to realize at a glance that the next badge period has begun. Thus, if you notice your dosimeter color is different from others in your department you should immediately exchange your old dosimeter for a new dosimeter.

The dosimeter badge should be worn anteriorly close to your body between your neck and waist. The dosimeter should not be worn on loose garments (e.g., open lab coats) which might permit the dosimeter to dangle into a radiation field which is much higher than the field your wholebody is experiencing. For individuals wearing lead protective aprons the dosimeter should be worn at the collar level outside of the lead apron unless lead thyroid and eye shields are used; in this case the dosimeter would be worn under the lead apron.

The exchange frequency of the new dosimeter is also being tailored to best suit each department. Most departments will be on the usual monthly exchange frequency with the exchange date being the first of each month.

Item 17 A
7/26/84

Some departments whose histories show a large percentage of minimal monthly readings have been revised to a quarterly exchange frequency. Thus their exchange date would be the first day of each calendar quarter. Other departments experiencing larger monthly exposures have been revised to a bi-weekly exchange protocol, thus their exchange dates would be the first and fifteenth day of each month.

II The Cost of the New Dosimeters

The new dosimeters are not inexpensive. The Radiation Protection Office has chosen the most reliable dosimeter company and the most reliable dosimeter to monitor the radiation exposure of the AGH personnel.

Inherent with these choices is a higher associate cost which is considered reasonable. The greatest problem with this new dosimeter system is if/when badges are recklessly accounted for and are misplaced or lost. The hospital will be charged $6.00 for each dosimeter not returned within three months of the required return date of the dosimeter. If particular departments exhibit excessive lack of responsibility in assuring return of dosimeters, the Radiation Protection Office will be assessed extensive charges for lost dosimeters which may eventually have to be the financial responsibility of the involved department. Thus it is the Radiation Protection Office's plea that each dosimeter user accept the responsibility of first wearing the dosimeter, second exchanging old dosimeters for new dosimeters in a timely fashion, and third taking time out to organize the off hour storage of dosimeters to avoid the misplacement or loss of radiation dosimeters outside the hospital.

The Radiation Protection Office will be more than happy to help concerned departments obtain a dosimeter storage board which would serve as a badge exchange board, an information update board, and an off hours storage place for dosimeters.

III The Reporting System

The Radiation Protection Office has also re-evaluated its interactions with radiation dosimeter using work force at Allegheny General Hospital. The Radiation Protection Office feels that the lines of communicating exposure status to badge workers has not been excellent, and in many instances it is felt that the badge wearer has not been adequately informed of his/her exposure status. With this in mind the Radiation Protection Office has been granted by the Radiation Safety Committee to initiate a memorandum based information system for alerting individual dosimeter users that he/she has received a radiation exposure in excess of an Action Level or in excess of an Action Level exposure rate.

Item 17A
7/26/84

What is an Action Level?

An Action Level represents an established range of radiation exposure in units of millirems which fall between a fraction of the maximum permissible exposure and the maximum permissible exposure limit. Should an individual's dosimeter results indicate that his/her quarterly exposure has surpassed the established threshold value of an action level, the Radiation Protection Office, whose goal it is to seek methods of reducing radiation exposures to levels which are ALARA or As Low As Reasonably Achievable, will set into motion a review, comparison and investigation with ALARA exposure totals being the ultimate goal.

Two Action Levels have been established and they are Action Level I and Action Level II.

Action Level I:

Action Level I represents an exposure (mRem) or rate of exposure (mRem/month or mRem/quarter) in which the dosimeter record indicates an exposure in excess of 1/10 but less than 3/10 of the legal maximum permissible occupational exposure. Thus a dosimeter reading in which the individual is reported to have received an exposure from 120 mRem to 375 mRem during a quarter of the calendar year would represent an Action Level I exposure.

Action Level II:

Action Level II represents a larger exposure in which the individual receives between 3/10 and the maximum permissible legal occupational exposure. Thus, Action Level II would indicate that the individual had received between 375 mRem to 1,250 mRem wholebody exposure during a calendar quarter of the year.

The Radiation Protection Office has devised a report form for reporting Action Level I and II exposures to the dosimeter-wearing individuals working at AGH. This report is not issued as a scare tactic but rather as a vehicle for informing individuals of their exposure status with hopes that such information will encourage greater radiation protection awareness, and empahsis. (See Attached Form).

Explaining the risks associated with radiation exposure are beyond the scope of this memorandum. It should be noted that the 'Sceintific Community'* agrees that an individual receiving the maximum permissible radiation exposure each year of his/her working life time (30 years) would not likely experience nor would his offspring likely experience a greater increased risk of induced injury or disease from the radiation exposure than the risks individuals working in a non-radiation related fields would receive from the potential hazards in their occupations. In fact, the literature reveals that the risks assoicated with experiencing a working lifetime of the maximum permissible occupational exposure is very possibly safer than the risks other occupations experience.

I hope that the new dosimeters and reporting system are to your liking and that you feel comfortable with the responsibilities of properly using and handling these radiation detection dosimeters.

Sincerely,

Frank P. Ottino

Frank P. Ottino, M.Sc.
Health Physicist

* National Council on Radiation Protection and Measurements (NCRP)
International Commission on Radiation Protection (ICRP)
National Academy of Science (BEIR)
United Nation Scientific Committee (UNSCEAR)

P.S. Department Chief/Director: Please submit a copy of this correspondence into your procedure manual for future reference by new and current dosimeter wearing staff.

Item 17A
7/26/84

Allegheny General Hospital
Departmental Correspondence

DATE:

FROM: Frank Ottino, M.Sc. DEPT: Radiation Protection

SUBJECT: ALARA Program Action Level Notification

TO: DEPT:

The Radiation Protection Office (RPO) is responsible for issuing personal radiation exposure monitors (doismeters) and reviewing the subsequent radiation exposure results. The Radiation Protection Office (RPO) analyzes the dosimeter results as to whether reported radiation exposure levels are greater than established action levels. These action level exposures are by no means considered to be unsafe, but rather exposure levels set to trigger first a notification and second, when necessary, an investigation of the exposure by the Radiation Protection Office. This memorandum, representing the action level notification, is submitted to give the dosimeter wearer an opportunity through awareness to reduce their radiation exposure.

The philosophy of the action levels are extracted from a program devised by the U.S. Nuclear Regulatory Commission entitled ALARA, whose goal it is to reduce exposures of individuals working with sources of radiation to levels which are As Low As Reasonably Achievable. By definition the action levels are represented as follows:

| Type | Action Level I | Action Level I Rate |
|---|---|---|
| Head or Wholebody Exposure | 10% - 30% MPE* or 125 mRem -375 mRem per quarter year | 40 - 125 mRem/month or 20 - 60 mRem/2 weeks |

| Type | Action Level II | Action Level II Rate |
|---|---|---|
| Head or Wholebody Exposure | 30% - 100% MPE* or 375 mRem -1,250 mRem per quarter year | 125-415 mRem/month or 60 -190 mRem/2 weeks |

* Where MPE means Maximum Permissible Exposure

With this in mind this memorandum is sent to notify you of the following information:

| Badge Period | Action Level Rate | % MPE Rate | Total Exposure |
|---|---|---|---|
| | | % | mRem |

Item 17A
7/26/84

Thus this notification is submitted to you to inform you of your radiation exposure trend with hopes that this information will assist you in reducing your prospective radiation exposure. Your options for reducing your exposure levels are:

1. Decreasing your time of being exposed to radiation.

2. Increasing your distance from the source of radiation.

3. Imposing added shielding between yourself and the source of radiation.

4. Requesting the RPO to investigate your work habits with and around your associated source of radiation.

Please feel free to call Ext. 3485 or come up to the Radiation Protection Office on the Eighth Floor, East Tower of the Old Hospital, to discuss this important subject.

Sincerely,

Frank P. Ottino, M.Sc.
Health Physicist

FPO:csg

Item 17A
7/26/84

Allegheny General Hospital
Departmental Correspondence

DATE:

FROM: Frank Ottino, M.Sc. DEPT: Radiation Protection

SUBJECT: Summary of ALARA Action Level Reports

TO: DEPT:

During the September 27, 1983, Radiation Safety Committee (RSC) meeting the Radiation Protection Office reported the progress of the ALARA Action Level reports. The RSC was in favor of issuing reports to the individuals receiving elevated exposure readings. The RSC showed some concern that, though the individual was receiving the report, the supervisor was possibly unaware of such reports to their staff. As a result the Radiaton Protection Office will summarize the list of individuals per department receiving an ALARA Action Level Report and submit this list to the department supervisor and the chairman of the RSC.

Individuals in your department whom have received an Action Level Report are as follows:

Sincerely,

Frank P. Ottino, M.Sc.
Health Physicist

FPO:csq

cc: Oscar M. Powell, M.D.
Chairman, Radiation Safety Committee

Item 17A
7/26/84

# Cobalt-60 Teletherapy Safety Procedures

1. The procedures outlined in the texts entitled Cobalt-60 Warm up Procedures, weekly and Cobalt-60 warm up Procedures, daily, must be performed accordingly.

2. Personnel working in the Radiation Therapy Department must wear a personal dosimeter. Use, storage and exchange responsibilities concerning the use of personal dosimeters are detailed in the correspondence entitled, "Review of Radiation Dosimeter Procedures and Descriptions of New Badges", 7/20/83, which is found in the Radiation Therapy's Radiation Safety Manual.

3. Each Cobalt-60 operator must be familiar with the "Emergency Instructions - Cobalt Unit" posted at the control panel and in the Radiation Therapy's Radiation Safety Manual.

4. At the end of each working day or at any time when Radiation Therapy Staff have left the treatment area the Cobalt-60 teletherapy unit must be turned off, the keys taken out of the control panel and put away and the entrance door locked. All this must be performed in order to guard against unauthorized use of the Cobalt-60 unit and unauthorized entry into the cobalt treatment suite.

5. Monthly spot checks must be performed as detailed in 10-CFR-35.22. These surveys will be performed by or under the supervision of the Medical Physics Staff. These records will be audited monthly by the Radiation Protection Office.

6. Annual full calibrations will be performed by the Medical Physics Staff. These records will be audited by the Radiation Proteciton Office annually.

7. Leak testing of the Cobalt-60 source will be performed by the Radiation Protection Office.

8. Calibration of portable survey meters and the preservation of records will be performed and maintained by the Radiation Protection Office.

9. Quality assurance threshold checks on the source position monitor will be conducted by the Radiation Protection Office. Records will be documented on the Cobalt-60 warmup Checklist form.

Item 17A
7/26/84

# Cobalt Unit
# Emergency Procedures

I. A Cobalt Emergency is a:
   1. Breakdown of any part of the teletherapy head, source or mechanism involving the source; or,
   2. Red light remaining on when clock is off. (Red lights on the control panel, on Cobalt apparatus, above door, and SPI radiation monitor).

II. Action to be Taken in the Event of an Emergency:
   1. Press the "Emergency" bar on the control unit. If the beam remains "on", turn off both main switches.
   2. Open the door and advise the patient to get off the table and leave the room.

## Warning

Avoid exposure to the direct primary beam; do not remain in the treatment room any longer than is absolutely necessary while the beam is "on".

If the patient is unable to get off the table and leave the room do the following:
   1. Inform the Radiation Protection Office or a Therapy Department Physician and perform the following:
   2. Turn power switches "ON".
   3. Rotate the head, using the remote position button on the control panel, towards the front wall to an angle of $90^{\circ}$ (a horizontal position).
   4. Enter the room to a position behind the head, avoiding the main beam. Close the shutter manually by turning the Emergency Shutter Handwheel on the front of the head in the direction indicated by the arrows (clockwise).
   5. If the shutter still does not close (the red marker on the handwheel is "up" when it is closed):
      a. Move the machine and/or table so that the beam is not directed on the patient, and close the collimator completely, avoiding the main beam.
   6. Remove patient from treatment room.
   7. After the patient has left the room, LOCK THE DOOR making sure no one remains inside. Do not allow anyone to enter the room until help arrives. Turn off power and remove keys from control panel.
   8. Inform at least one of the following:
      a. Roy E. Summers, M.Sc., Ext 6164
      b. Frank P. Ottino, M.Sc., Ext 3485
      c. Prakash N. Shrivastava, Ph.D., Ext. 4171
      d. Any physician in the Therapy Department
   9. Inform the Picker X-Ray Company, Medical X-Ray Service Milt Karel at 923-1350. Also inform Dave Borelli through the Paging Operator.

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Item 19: Leak Testing

The semi-annual leak tests will be performed by, or under the direction of, the Radiation Protection Officer.

The source is tested by wiping accessible locations on or around the head of the unit where contamination might be expected to accumulate (if leakage were to occur) and will include the inner surface of the most frequently used treatment cones or beam collimating device. The test will be taken with the source in its "off" position.

The test is conducted using filter papers or cotton swabs which have been moistened with water, alcohol or similar fluids which would not debrade the source or its housing. The filter papers or cotton swabs are placed in test tubes or sealed envelopes until assay is made. The individual performing the leak test uses a ring badge with a thermoluminescent dosimeter or other suitable extremity monitors. Assay of the test is made using either a gas flow proportional counter or a gamma scintillation counter. A small strength reference source of the same isotope or one similar in energy is counted. A background count is then taken using unused filter papers or cotton swabs. The net count rate divided by the reference source activity gives the detection efficiency. The error associated with the assay is determined by dividing the square root of the background counts by the (background) counting time and then multiplying this value by 3.0 to give a 99+% confidence level (assuring that the likelihood of achieving a wrong result due to random variation would be less than one chance in one hundred). This three sigma error is then divided by the efficiency to yield the minimum detectable activity. The MDA has not been found to exceed 1 nanocurie and is usually on the order of a few tens of picocuries, well below the 0.05 uCi leakage limit.

Current radiation detection instrumentation utilized to analyze the leak tests include a Packard Corporation Autogamma Scintillation Spectrometer (incorporating two single channel analyzers coupled to a large NaI (Tl) crystal) or a Nuclear Measurements Corporation PCC-11TC/DS-3 Gas flow proportional counting system.