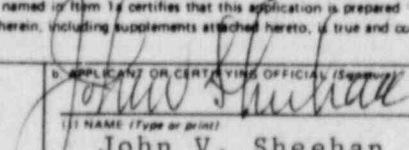


EXHIBIT A

NRC Form 3137 10 CFR 35		U.S. NUCLEAR REGULATORY COMMISSION		Approved by OMB 3150-0081 Expires 1-31-88										
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 Materials 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.) <small>INCLUDE ZIP CODE</small> Veterans Administration Medical Center 2002 Holcombe Blvd. Houston, TX. 77211			1.b. STREET ADDRESS(ES) AT WHICH RADIOACTIVE MATERIAL WILL BE USED <small>(If different from 1.a.) INCLUDE ZIP CODE</small> Same											
2. PERSON TO CONTACT REGARDING THIS APPLICATION John H. Liem, M. D. 745 Z			3. THIS IS AN APPLICATION FOR: (Check appropriate item) <input type="checkbox"/> a. NEW LICENSE <input type="checkbox"/> b. AMENDMENT TO LICENSE NO. _____ <input checked="" type="checkbox"/> c. RENEWAL OF LICENSE NO. _____											
4. INDIVIDUAL USERS (Name individuals who will use or directly supervise use of radioactive material. Complete Supplements A and B for each individual.) 1. John H. Liem, M. D. 2. Jaisiri Jaiwatana, M. D. 3. James D. Easley, M. D.			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.) 1. Philip H. Cooper, Ph.D. 2. L. David Gager, M.S. 3. Medical Radiation Physics Consultants											
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.	Cobalt 60	A.E.C.L. or neutron	C-146 or C-151	7,500 curies	Two									
B.		products	or NPI-25	7,500 curies	Two									
C.	Depleted uranium	A.E.C.L.	Collimators	less than 500 lbs	-									
7. TELETHERAPY UNITS (Attach supplemental pages, if necessary)														
	NAME OF MANUFACTURER (Include description, if unit is custom made)			MODEL NUMBER										
A.	Atomic Energy of Canada, Limited			T-780										
B.														
C.														
8. USE (Attach supplementary pages, if necessary)														
<table border="1" style="display: inline-table; vertical-align: top;"> <tr> <td style="width: 33%; text-align: center;">A</td> <td style="width: 33%; text-align: center;">B</td> <td style="width: 33%; text-align: center;">C</td> </tr> <tr> <td style="text-align: center;"> </td> <td style="text-align: center;"> </td> <td style="text-align: center;"> </td> </tr> <tr> <td style="text-align: center;">X</td> <td style="text-align: center;"> </td> <td style="text-align: center;"> </td> </tr> </table> <div style="display: inline-block; vertical-align: top; margin-left: 10px;"> HUMAN USE ONLY HUMAN AND OTHER USE <small>(Specify on separate sheet)</small> </div> <div style="text-align: center; margin-top: 10px; font-size: large;">SEE SUPPLEMENTARY PAGE, Item 8</div>						A	B	C				X		
A	B	C												
X														
9. PERSONNEL MONITORING DEVICES														
TYPE (Check and/or complete as appropriate)		SUPPLIER (Service Company)		EXCHANGE FREQUENCY										
(1) FILM BADGE — WHOLE BODY														
X (2) THERMOLUMINESCENCE DOSIMETER (TLD) — WHOLE BODY		Landauer		Monthly										
(3) OTHER (Specify):														

8512050143 851025
 REG4 LIC30
 42-00084-08 PDR

EXHIBIT A (Continued)

INFORMATION REQUIRED FOR ITEMS 10 THROUGH 21	
<p>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 teletherapy 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: _____</p>	
10. MEDICAL ISOTOPE COMMITTEE	15. BEAM STOPS
<input type="checkbox"/> Names and specialties attached; and (check one)	<input checked="" type="checkbox"/> Description of stops used to restrict beam orientation attached.
<input checked="" type="checkbox"/> a. Duties as in Appendix A, or	16. SHIELDING EVALUATION
<input type="checkbox"/> b. Equivalent duties attached.	<input checked="" type="checkbox"/> Evaluation of proposed shielding attached.
11. TRAINING AND EXPERIENCE	17. OPERATING AND EMERGENCY PROCEDURES
<input checked="" type="checkbox"/> a. Supplements A & B attached for each individual user; and	<input checked="" type="checkbox"/> a. Description of operating procedures attached; and
<input checked="" type="checkbox"/> b. Supplement A attached for RSO	<input checked="" type="checkbox"/> b. Copy of emergency procedures attached.
12. INSTRUMENTATION (check one)	18. INSTRUCTION OF PERSONNEL (check one)
<input checked="" type="checkbox"/> a. Appendix C form attached; or	<input type="checkbox"/> a. Training program and schedule in Appendix H followed; or
<input type="checkbox"/> b. List manufacturer's name and model number	<input checked="" type="checkbox"/> b. Description of instruction program for employees attached
13. CALIBRATION OF INSTRUMENTS (check one)	19. LEAK TESTS OF SEALED SOURCES
<input checked="" type="checkbox"/> a. Appendix D, Part 2 procedures followed for instrumentation calibration; or	<input checked="" type="checkbox"/> Description of leak-test procedures attached.
<input checked="" type="checkbox"/> b. Description of sources, calibration frequency and equivalent procedures attached.	20. QUALIFIED EXPERT (Use only if the individual fails to meet 10 CFR 35.24 requirements.)
14. FACILITIES AND EQUIPMENT	Statement of qualifications of the expert who will perform teletherapy calibrations attached.
<input type="checkbox"/> a. Description and drawing of facilities attached; and	21. ALARA PROGRAM (check one)
<input checked="" type="checkbox"/> b. Description of patient viewing and communicating systems attached; and	ALARA Program as in Appendix I, or
<input type="checkbox"/> c. Description of area safeguards attached.	<input checked="" type="checkbox"/> Equivalent ALARA program attached
22. CERTIFICATE	
(This item must be completed by the applicant)	
<p>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.</p>	
a. LICENSE FEE REQUIRED (See section 170.31, 10 CFR 170)	b. APPLICANT OR CERTIFYING OFFICIAL (Signature) 
(1) LICENSE FEE CATEGORY	(1) NAME (Type or print) John V. Sheehan
(2) LICENSE FEE ENCLOSED	(2) TITLE Director, VAMC, Houston, TX.
\$	c. DATE February 22, 1985
<p>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.</p>	

SUPPLEMENTARY PAGE

ITEM 8

A. Use of the source housed in the A.E.C.L. Theratron 780 teletherapy unit for other than human use will be under the supervision of L. David Gager, M.S. and limited to a) calibration and maintenance procedures, and b) irradiation of lower animals, biological specimens or inanimate objects excluding explosives and highly flammable materials.

MEDICAL ISOTOPES COMMITTEE

Item 8, March 1985

- A. a. The responsibility and duties of the Committee
- b. The meeting frequency of the Committee (at least quarterly)
- c. The name and specialty of each member of the Committee

**Veterans
Administration**

MEDICAL CENTER LETTER NO. 85-10

SUBJ: Radiation Safety Committee

I. DESIGNATION:

A. The following personnel are appointed members of the Radiation Safety Committee (RSC). Additional individuals may be invited to participate, as necessary, to resolve specific problems.

Chief, Nuclear Medicine Service	Chairman
Radiation Safety Officer	Member
Administrative Assistant/COS	Member
Safety Specialist, Eng. Service	Member
Nuclear Medical Scientist, Nuclear Med. Svs.	Member
Associate COS/Research	Member
Chief, Dental Service	Member
Chief, Laboratory Service	Member
Chief, Endocrinology Sect., Med. Svs.	Member
Chief, Nursing Service	Member
Chief, Pharmacy Service	Member
Chief, Radiology Service	Member
Chief, Radiotherapy Service	Member

B. The Radiation Safety Officer (RSO) will act as secretary, and in the absence of the Chairman, will preside.

II. RESPONSIBILITIES:

A. Radioactive material will be used in accordance with the licenses issued by the U.S. Nuclear Regulatory Commission (NRC), under the supervision of the individuals designated by the RSC.

B. Radiation from equipment, whether for diagnostic or for therapeutic purposes, will comply with current regulations.

C. The RSC will review training and experience of users of radioactive material and will evaluate exposure to radiation of any provenience in the Medical Center.

D. The RSC will establish procedures that will protect patients, radiation users and the environment against undue exposure to radiation. It will ensure that all activities in the Medical Center involving the use of radiation are in compliance with the rules set forth by the NRC, Food and Drug Administration (FDA) with the recommendations made by the National Council on Radiation Protection and Measurements (NCRP), and the Joint Commission on Accreditation of Hospitals (JCAH).

MEDICAL CENTER LETTER NO. 85-10

E. The RSC will issue a Radiation Safety Manual which incorporates the pertinent rules and recommendations cited above, will establish policies that are appropriate for this Medical Center and will be observed by the project supervisors.

F. The RSC will prepare Radiation Accident Protocol and pertinent emergency policies.

G. The RSC will be assisted in its effort by the RSO, who will oversee the day-to-day compliance with radiation safety rules, acquisition of radioactive materials by the users within this Medical Center, disposal of radioactive waste and keep the necessary records. The RSO will have the authority to instantly terminate any operation that represents an undue radiation hazard, and notify the Chairman, RSC, about such intervention.

H. The Chairman of the RSC will appoint a Radioactive Drug Research Subcommittee (RDRS) and will serve as its Chairman. The RDRS will assume the responsibilities for review of all projects within the Medical Center, involving radioactive material whether for use in vivo or in vitro, and whether for new routine clinical or for research proposes.

I. Applications for use of radioactive material will be submitted in proper form for review to the RSO, who in turn will present it to the RDRS for ruling. The RSO will inform the RSC at its next meeting of all applications and result of the RDRS ruling.

III. MEETINGS:

A. RSC meetings will be held quarterly on the second Wednesday of February, May, August and November, and as deemed necessary.

B. RDRS meetings will be held monthly on the second Wednesday.

IV. MINUTES:

Written minutes of the RSC and RDRS will be retained on file by the RSO. Copies of the RSC minutes will be distributed to the Director, Chief of Staff, Service Chiefs, Health Systems Review Officer, Quality Assurance Coordinator, and the Committee Members.

V. REFERENCES:

A. NRC Radioactive Material Licenses to the VAMC, Houston:

1. License No. 42-00084-06 ("Broad" license)
2. License No. 42-00084-07 (Research Source)
3. License No. 42-00084-08 (Radiotherapy Source)

B. NRC Regulatory Guide 10.8, Revision I, October 1980.

C. Appendix A to the NRC Regulatory Guide 10.8, Revision, Federal Register, Volume 47, Number 232, of December 2, 1982.

D. FDA, Federal Register, Volume 40, Number 144.

E. NCRP Report Number 49 "Structural Shielding Design and Evaluation for Medical Use of X-rays and Gamma Rays of Energies up to 10 MeV", Washington, D.C., 1976.

MEDICAL CENTER LETTER NO. 85-10

F. U.S. Department of Health, Bureau of Radiological Health, "Routine Compliance Testing for Diagnostic X-ray Systems", 1976.

G. Radiation Safety Manual, VAMC, Houston.

All references may be obtained from the RSO.

VI. RESCISSION:

Medical Center Letter No. 83-152 dated December 23, 1983.

JOHN V. SHEEHAN
Director

DISTRIBUTION:

SC
SD Committee Members
HSRO/QA Coordinator (002C)
Chairman, Research & Development Committee

SUPPLEMENTAL PAGE

ITEM II Training and Experience

A. Authorized Users

1. John H. Liem, M. D., Certified by American Board of Radiology, 1978
and
2. James D. Easley, M. D., Certified by American Board of Radiology, 1971

have been previously authorized to perform teletherapy treatment at the Houston VA Medical Center under NRC License No. 42-84-8.

3. Jaisiri Jaiwatana, M. D., Certified by American Board of Radiology, 1983

is to be added to the authorized users to perform teletherapy treatment at the Houston VA Medical Center. Curriculum Vitae and copy of ABR Certification are attached.

B. Radiation Safety Officer

1. L. David Gager, M.S., Certified by American Board of Radiology, 1978.
and
2. Philip H. Cooper, Ph.D.

have been previously authorized to perform the duties of R.S.O. for Radiotherapy at the Houston VA Medical Center under NRC License No. 42-84-8.

Please see attached Curriculum Vitae:

CURRICULUM VITAE

PERSONAL:

JOHN H. LIEM, M. D.
1706 Cole's Farm Drive
Sugar Land, Texas 77479

BORN: February 2, 1938
Sokaradja, Indonesia

MARRIED: 3 children

CITIZENSHIP: Naturalized U. S. citizen

JOB OBJECTIVE:

- to qualify for a full-time staff position in the Radiotherapy Service, VAMC, Houston, Texas, using extensive experience and background in Therapeutic and General Radiology.

OFFICE ADDRESS:

Veterans Administration Medical Center
Radiotherapy Service
2002 Holcombe Blvd.
Houston, Texas 77211
Phone: 713/795-7433.

EXPERIENCE AND TRAINING:

- Board Certified in Therapeutic Radiology by American Board of Radiology and qualified in General Radiology, December 14, 1978.

June 1, 1980 - Present
Chief, Radiotherapy Service
VA Medical Center
2002 Holcombe Blvd.
Houston, Texas 77211

July 1, 1981 - present
Assistant Professor, Therapeutic Radiology
Department of Radiology
Baylor College of Medicine
Houston, Texas

CURRICULUM VITAE
JOHN H. LIEM, M. D.

- July 1, 1977 - May 30, 1980
Acting Chief, Radiotherapy Service
VA Medical Center
Houston, Texas
- July 1, 1977 - June 30, 1978
Clinical Instructor, Therapeutic Radiology
Department of Radiology
Baylor College of Medicine
Houston, Texas
- July 1, 1975 - June 30, 1977
- Two years additional training in Therapeutic Radiology,
Baylor College of Medicine, Houston, Texas. During this
training I had extensive experience in treating a large
number of male and female cancer patients.
- July 1, 1972 - June 30, 1975
- Three years approved residency training in General
Radiology, Baptist Memorial Hospital, 111 Dallas St.,
San Antonio, Texas 78205.
- This training included General Diagnostic Radiology,
Therapeutic Radiology and Nuclear Medicine.
- January 19, 1974
Texas State Board of Medical Examiner
License # E 1024
- Other State License:
Washington State License, # 17140
- January 1966 - June 1972
- Private practice as general practitioner in Jakarta,
Indonesia.
- March 1971 - June 1972
- General radiology training in general county hospital,
Jakarta, Indonesia.
- February 10, 1971
ECFMG Certification # 121-0483
- 1966 - 1972
- Employed by Government, Republic of Indonesia.
- October 25, 1965
- Graduated as an M.D., Airlangga University Medical
Faculty in Surabaya, Indonesia.

1957 - 1965

- Airlangga University Medical Faculty, Surabaya, Indonesia.

1951 - 1957

Junior and High School in Indonesia.

PUBLICATIONS:

1. Aryl Hydrocarbon Hydroxylase Inducibility and Lymphoblast Formation in Lung Cancer Patients. Prasad, N., Prasad, R., Harrell, J.E., Thornby, J., Liem, J.H., Cs.
2. Aryl Hydrocarbon Hydroxylase Inducibility in Lung Cancer Patients Undergoing Radiotherapy. Prasad, N., Prasad, R., Harrell, J.E., Liem, J.H., Cs.

The American Board of Radiology

*Organized through the cooperation of the
American College of Radiology, the American Roentgen Ray Society,
the American Radium Society, the Radiological Society of North America,
the Section on Radiology of the American Medical Association
and the American Society of Therapeutic Radiologists
Hereby certifies that*

John Hong Dje Liem, M.D.

*Has pursued an accepted course of graduate study
and clinical work, has met certain standards and qualifications and
has passed the examinations conducted under the authority of*

The American Board of Radiology

On this fourteenth day of December, 1978

*Thereby demonstrating to the satisfaction of the Board
that he is qualified to practice the specialty of
Therapeutic Radiology*



E. Richard Ling
President

C. Allen Good
Secretary



CURRICULUM VITAE

Name: JAISIRI JAIWATANA
Birth Date: May 6, 1948
Sex: Male
Citizenship: U.S.
S.S. Number: 213-80-0586

EDUCATION AND TRAINING

Medical School: Faculty of Medicine Siriraj Hospital
Bangkok, Thailand.
Graduated March, 1972

Internship: Siriraj Hospital, Bangkok, Thailand
April 1, 1972 - March 31, 1973

Prince George's General Hospital
Cheverly, Maryland 20785
July 1, 1974 - June 30, 1975

Residency: Internal Medicine, Prince George's General Hospital
July 1, 1975 - June 30, 1976

Medical Oncology, Georgetown Tumor Service
District of Columbia General Hospital
Washington, D.C. 20003
July 1, 1978 - June 30, 1979

Radiation Therapy, University of Maryland Hospital
Baltimore, Maryland 21201
July 1, 1979 - June 30, 1982

EXPERIENCE

Physician, Nakornrajsima Hospital
Nakornrajsima, Thailand
April 1, 1974 - March 31, 1975

Emergency Room Physician
District of Columbia General Hospital
Washington, D.C. 20003
October 22, 1976 - June 30, 1978

EXPERIENCE -con't

Physician, Georgetown Tumor Service
District of Columbia General Hospital
Washington, D.C. 20003
July 1982 - November 1982

CURRENT STATUS:

Certified by the American Board of Therapeutic Radiology
Medical Staff, Radiotherapy Service
Veterans Administration Medical Center
Houston, Texas 77211

EXHIBITION:

"Mucin Producing Adenocarcinoma of the Bladder"
exhibited at the American Society of Therapeutic
Radiologists Meeting, the Scientific Section,
October 1981, Orlando, Florida.

PRESENTATION:

"Primary Carcinoma of the Female Urethra - A 20 Year
Experience" presented at the Radiological Society of
North America Meeting in November 1982, Chicago, Illinois.

PUBLICATIONS:

1. "Mucin-Producing Adenocarcinoma of the Bladder
-Clinicopathologic Report." Cengiz Aygun, M.D.,
Vinita Patanaphan, M.D., Nancy O. Whitley, M.D.,
Wilfred Sewchand, D.Sc., Jaisiri Jaiwatana, M.D.,
John D. Young Jr., M.D., Thongbliew Prempre, M.D.,
Ph.D.; UROLOGY, Vol.XXI, No.2, Feb 1983, 135-139.
2. "Adenocarcinoma Arising in the Female Urethral
Diverticulum." Vinita Patanaphan, M.D., Thongbliew
Prempre, M.D., Ph.D., Wilfred Sewchand, D.Sc.,
Mohammad Abdul Hafiz, M.D., Jaisiri Jaiwatana, M.D.,
UROLOGY, Vol.XXII, No.3, Sept. 1983, 259-264.
3. "Radiation Management of Advanced Nasopharyngeal
Cancer." Rumpa Amornmarn, M.D., Thongbliew Prempre
M.D., Ph.D., Wilfred Sewchand, D.Sc., and Jaisiri
Jaiwatana, M.D., CANCER, 52:802-807, 1983.
4. "Radiation Management of Carcinoma of the Tonsillar
Region." Rumpa Amornmarn, M.D., Thongbliew Prempre,
M.D., Ph.D., Jaisiri Jaiwatana, M.D., Morris Weizenberg
M.D., CANCER 54:1293-1299, 1984.

The American Board of Radiology

*Organized through the cooperation of the
American College of Radiology, the American Roentgen Ray Society,
the American Radium Society, the Radiological Society of North America,
the Section on Radiology of the American Medical Association
and the American Society of Therapeutic Radiologists*

Whereby certifies that

Jaisiri Jaiwatana, M.D.

*Has pursued an accepted course of graduate study
and clinical work, has met certain standards and qualifications and
has passed the examinations conducted under the authority of*

The American Board of Radiology

On this third day of June, 1983

*Thereby demonstrating to the satisfaction of the Board
that he is qualified to practice the specialty of*

Therapeutic Radiology



James F. Wright
President

John H. L. Zuckerman, M.D.
Secretary

145812



DEPARTMENT OF HEALTH AND MENTAL HYGIENE
LICENSE, REGISTRATION, OR CERTIFICATION RENEWAL

THE MARYLAND STATE BOARD OF MEDICAL EXAMINERS
CERTIFIES THAT JAISIRI JAIWATANA
IS AN AUTHORIZED PHYSICIAN AND SURGEON

IN ACCORDANCE WITH THE HEALTH OCCUPATIONS ARTICLE OF THE ANNOTATED CODE OF MARYLAND

LIC. REG. CERT. NO.
020061

EXPIRATION DATE
09/30/86

John P. Kelly, MD *John P. Kelly, MD*
SECRETARY SECRETARY

WHERE REQUIRED BY LAW THIS MUST BE CONSPICUOUSLY DISPLAYED IN OFFICE TO WHICH IT APPLIES

CURRICULUM VITAE

James D. Easley, M.D.
Department of Radiotherapy
The Methodist Hospital
6565 Fannin
Houston, Texas 77030

Born: December 13, 1939 Klamath Falls, Oregon

Wife: Marilyn Ruth Easley

Children: (2) David and Mary Lynn

EDUCATION:

High School: Cassville High School, Cassville, Missouri; 1953-1957

College: Southwest Baptist College, Bolivar, Missouri; 1957-1959
University of Missouri, Columbia, Missouri; 1959-1961 B.A.

Medical

School: Missouri School of Medicine, Columbia, Missouri; 1961-1965 M.D.

Internship: Kansas City General Hospital, Kansas City, Missouri;
1965-1966; Rotating - General

Residency: University of Missouri Medical Center, Columbia, Missouri;
1966-1967; Radiology 4 months; Radiotherapy 12 months
M.D. Anderson Hospital and Tumor Institute, Houston, Texas;
1967-1979; Radiotherapy

Military Surgeon (R) T-04 U.S. Public Health Service Corps. -
Service: Medical; 1969-1971

Licensure: Missouri: By Examination, #30175, 1965
Texas: #D-8697, 12/7/71

TEACHING AND HOSPITAL APPOINTMENTS:

Assistant Chief, Radiotherapy, Baltimore U.S. Public Health
Service Research Center; 1969-1971

Assistant Professor, Radiotherapy, Methodist Hospital;
1971-present

TEACHING AND HOSPITAL APPOINTMENTS CONT'D:

Courtesy Staff, Radiotherapist:

St. Luke's Episcopal Hospital and Texas Children's Hospital;
Diagnostic Center Hospital; The Woman's Hospital of Texas;
Medical Center del Oro; Memorial Hospital Systems

Clinical Assistant, Attending, Ben Taub General Hospital;
1971-present

Consultant, Veterans Administration Hospital; 1971-present

Director, Radiotherapy Department, The Methodist Hospital;
July 1, 1980

Director, Radiotherapy Department, Baylor College of
Medicine; July 1, 1980

SOCIETIES, Member:

Harris County Medical Society; Texas Medical Society; Texas
Radiology Society; American College of Radiology; Society of
Therapeutic Radiologists; Gilbert Fletcher Society; Southwest
Oncology Group; Pediatric Oncology Group.

PUBLICATIONS:

Easley, James D., and Fletcher, Gilbert H.: Analysis of the
Treatment of Stage I and Stage II Carcinomas of the Uterine
Cervix, The American Journal of Roentgenology. Vol. CXI,
No. 2, February, 1971.

Easley, James D., et al.: Quality of Survival in Histiocy-
tosis X, A Southwest Oncology Group Study, in press: Has
been accepted for publication in Archives of Diseases of
Childhood

Razek, Aly; Lane, Daniel; Cheek, William; Depersio, Edward;
Easley, James; Starling, Kenneth and Van Eys, Jan.
Medulloblastoma: A Randomized Trial for Radiotherapy and
Chemotherapy. Presented at American Society of Therapeutic
Radiologists, November 1977.

Nix, W. L., Starling, K. A., Easley, J. D., Steuber, C.P.,
Mahoney, D. H., and Fernback, D. J.: Allogenic Bone Marrow
Transplantation in the Setting of a General Children's
Hospital. Abstract submitted to "Southern Society for
Pediatric Research". Pediatric research, Vol. 15, #4.
April, 1981. page 583.

PUBLICATIONS CONT'D:

Carlton, C. E., Jr., Guerriero, W. G., Delaune, J., Hoffman, G., Scardino, P. T., Hudgins, P. T., Easley, J. D., Wilbanks, J. H.: "Interstitial 198 Au and External Radiotherapy Localized Carcinoma of Prostate" Baylor College of Medicine Departments of Urology. NIH Workshop, November 17-18, 1980.

Gottlieb, M.S., Bloom, M. K., Deaton, W. J., Denham, C., Easley, J. D., Stevens, P. M.: "Interstitial Gold Radionuclide Implantation Using the Flexible Bronchofiberscope". Departments of Medicine in Radiotherapy, Baylor College of Medicine. Paper submitted.

Mahoney, D., Glaze, D., Gerson, L.P., Starling, K. A., Easley, J. D.: "Abnormal CT Brain Scans in Children with Acute Lymphoblastic Keukemia". Baylor College of Medicine Departments of Pediatrics and Radiotherapy, Houston, Texas. (Submitted) Published: Pediatric Research, Vol 15, #4. April, 1981.

Easley, J. D., Denham, C. R., Wilbanks, J. H.: "Transbronchial Fiberoptic Implanting Technique of Endobronchial Lesions". Submitted to Internal Journal of Radiation Oncology, Biology, and Physics.

Easley, James D., Wilbanks, J., Patton, G.: "Radiation Treatment of Glomus Jugulare". Being Submitted.

Dennis, W. Sam, Easley, J. D., Kaplan, Alan, Kaufman, R., Wilbanks, J.: "Abdominal Strip Irradiation for Stage I Epithelial Tumors of Ovary". Being Submitted.

Easley, J. D., Wilbanks, J., Patton, G.: "Medulloblastoma Treated with Various Dose Fractions". Being Submitted.

Easley, J. D., Kaplan, Alan, Kaufman, R.: "Abdominal Irradiation of Fallopian Tube Carcinoma". Being Submitted.

Moura, R., McPherson, A., Easley, J.D.: "Treatment of Malignant Melonoma of Choroid with Episcleral 198 Au Plaque Zenon - Arc Photo Coagulation." To be submitted to American Journal of Ophthamology.

Boniuk, M. and Easley, J. D.: "Use of Radioactive Gold Plaques of Malignant Melanoma of Choroid. Paper in progress.

PUBLICATIONS CONT'D

Presentation by Dr's Easley, Ruberfield & Grossman:
"Treatment of Pituitary Tumor", for audiovisual department
of Jesse Jones Library, Baylor College of Medicine and
Learning Resource Center at the University of Texas,
Medical School, Houston, Texas.

Easley, J.D., Wilbanks, J.H., Moura, R.A., McPherson, A.R.:
"Episcleral Gold 198 Plaque and Xenon-Arc Photo Coagulation
Treatment of Malignant Melanoma of the Choroid." Submitted
to American Society of Therapeutic Radiologists for 25th
Annual Meeting, Nov. 1983, submitted April 1983.

Easley, J.D., Denham, C.R., Wilbanks, J.H., Wilson, R.K.:
"Flexible Fiberoptic Transbronchial Brachytherapy of Endo-
bronchial Carcinoma." Submitted to American Society of Thera-
peutic Radiologists for 25th Annual Meeting Nov. 1983. Submitted
April 1983.

Wilbanks, J.H., Easley, J.D., Dennis, W. Sam, Gilman, C.J.,
"Combined Interstitial and External Beam Radiotherapy for
Clinical Stage B Carcinoma of the Prostate". Submitted to
American Society of Therapeutic Radiologists for 25th Annual
Meeting Nov. 1983. Submitted April 1983.

Dennis, W. S., Easley, J.D., Wilbanks, J.H., Kaplan, A. and
Korhonen, M.: "Abdominal Strip Irradiation for Stage I Ovarian
Cancer". Submitted to American Society of Therapeutic Radiolo-
gists for 25th Annual Meeting Nov. 1983. Submitted April 1983.

Easley, J.D., McLaurin, R.L. and Wilbanks, J.H.:
Radiation Therapy of Optic Nerve Glioma". Submitted to
American Society of Therapeutic Radiologists for 25th Annual
Meeting Nov. 1983. Submitted April 1983.

Easley, J.D., Kenham, C.R. "Interstitial Implanter for the
Fiberoptic Bronchoscope." Submitted to New England Journal
of Medicine. 2/83.

Boniuk, M., Easley, J.D.: "Management of Choroidal Melanoma
with Radioactive Applicators". Submitted to Southern
Medical Association Meeting Nov. 1984.

PRESENTATIONS:

Wilbanks, J.H., Easley, J.D., Dennis, W. Sam, Gilman, C.J.,
"Combined Interstitial and External Beam Radiotherapy for
Clinical Stage B Carcinoma of the Prostate." Submitted
to American Society of Therapeutic Radiologists for 25th
Annual Meeting Nov. 1983.

Easley, J.D., Wilbanks, J.H.: "The Results of the Combined
Interstitial and External Beam Radiotherapy In Treatment of
Prostate Cancer." Presentation at Texas Radiological Society.
Submitted September 1984.

Easley, J.D., Wilbanks, J.H., Scardino, P.T., McLaurin, R.:
"The Effect of TUR In Disseminating Prostate Cancer."
Presentation at American Society of Therapeutic Radiology
and Oncology. Submitted October 1984.

Easley, J.D.: "Cancer Prevention Course." Presented at
Baylor College of Medicine. Submitted 1982.

Easley, J.D.: "Cancer Prevention Course." Presented at
Baylor College of Medicine. Submitted 1983.

Easley, J.D.: "Cancer Prevention Course." Presented at
Baylor College of Medicine. Submitted 1984

SCIENTIFIC MEETINGS:

Southwest Oncology Group (SWOG), 1973-1983
Pediatric Oncology Group, 1973-1983

COMMITTEE MEMBERSHIPS:

Cancer Tissue Committee, Methodist Hospital,
Cancer Prevention Committee, Baylor College of Medicine
American Cancer Society Board Member, Houston, Texas
SWOG Committees: Dr. Easley is a member of the
Pediatric Solid Tumor Committee and the Radiotherapy
Committee. He is one of the radiotherapy representatives
to all the pediatric committees. He has served on the
following committees: National Wilms' Tumor Study Group,
Pediatric Institutional Performance Review, and the
Quality Control Committee.

RESEARCH (Current):

Clinical review of 400 patients having received irradiation
for carcinoma of the endometrium, in regard to treatment
results and complications.

Clinical review of 184 patients having received irradiation
for carcinoma of the ovary, in regard to treatment results
and complications.

Clinical review of 85 cases of malignant lymphomas, Hodgkin's
disease, who have received irradiation.

Institution of review of intracranial tumors.

Study Coordinator for Pediatric Oncology Group research in
Acute Nonlymphocytic Leukemia (ANLL) in Children (POG-8101)
Methodist Hospital.

Proposed Study by Dr. Mahoney, Dr. Sam Dennis, and Dr. James
Easley, Title: Intra-arterial Cis Platinum Adjuvant Therapy
in Supratentorial Malignant Gliomas in Children.

Proposed Study - Total lymphnode Irradiation for Treatment
of Intractable Rheumatoid Arthritis, Baylor College of
Medicine, Institutional, Donald Marcus, Joel Kovarsky,
James D. Easley, W. Sam Dennis.

Organized through the cooperation of the
American College of Radiology, the American Roentgen Ray Society,
the American Radium Society, the Radiological Society of North America
and the Section on Radiology of the American Medical Association

Hereby certifies that

James David Easley, M.D.

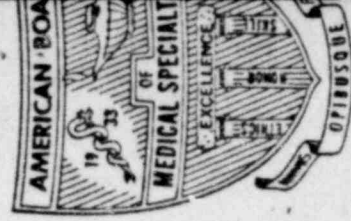
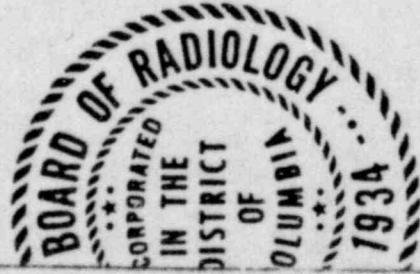
Has pursued an accepted course of graduate study
and clinical work, has met certain standards and qualifications and
has passed the examinations conducted under the authority of
The American Board of Radiology

On this tenth day of December, 1971
Thereby demonstrating to the satisfaction of the Board
that he is qualified to practice the specialty of

Therapeutic Radiology

John Farnese Rensch
President

C. Allen Good
Secretary



CURRICULUM VITAE

Name	L. David Gager, M.S. Assistant Professor of Radiotherapy Chief Radiotherapy Physicist
Address	11403 Burgoyne Houston, Texas 77077
Telephone	(713) 496-1523
Birthdate	July 23, 1941 Galveston, Texas
Marital Status	Married
Children	2

EDUCATION:

Texas A & M University, College Station, Texas 1960-1961
Texas Tech University, Lubbock, Texas 1962-1964
B.S. Biology, University of Houston, Houston, Texas 1970
M.S. Medical Physics, University of Texas graduate School of
Biomedical Sciences, Houston, Texas 1975
Certified in Radiotherapy Physics by the American Board of
Radiology, 1975

EMPLOYMENT HISTORY:

1964 - 1971

Radiology Physics Technician
Physics Department, University of Texas
M. D. Anderson Hospital and Tumor Institute
Houston, Texas

March 1971 - November 1975

Radiological Physics Assistant, Radiology Department,
Baylor College of Medicine
Houston, Texas

July 1975 - present

Chief Radiotherapy Physicist, Baylor College of
Medicine/The Methodist Hospital

TEACHING/FACULTY APPOINTMENTS

Instructor of Radiotherapy Physicist
Baylor College of Medicine/The Methodist Hospital

Associate Director of Baylor College of Medicine of
Radiation Therapy Technology

CONSULTANT

The Methodist Hospital
Veterans Administration Hospital
Houston Northwest Hospital
Harris County Hospital District (member of the Radiation
Safety Committee)

PROFESSIONAL ORGANIZATION MEMBERSHIPS AND OFFICES

American Association of Physicists in Medicine, Junior Member, March, 1975-December 1975
American Association of Physicists in Medicine, Full Member, January 1976 to present
Southwest Chapter of the American Association of Physicists in Medicine, March 1971 to present. Secretary/Treasurer, 1977-1979
Texas Regional Medical Physics, March 1971 to present, Board of Counselors
American College of Radiology, 1978 to present
Texas Radiological Society, 1978 to present

CONTINUING EDUCATION

Certificates Held:

1975	High Energy Electron, X-Ray and Neutron Dosimetry The University of Texas Health Science Center at Houston Division of Continuing Education
1976	Radiation Dosimetry A.A.P.M. Summer School Trinity College, Burlington, Vermont
1978	The Teaching of Medical Physics A.A.P.M. Summer School University of California, Santa Cruz, California
1979	Electron Linear Accelerators in Radiation Therapy A.A.P.M. Workshop Washington, D.C.
1979	Neutrons from Electron Medical Accelerators U.S. Department of Commerce National Bureau of Standards

PUBLICATIONS

Articles Published

Wright, A. E., Gager, L. D., and Hudgins, P.T., A Diode-Scanner-Recorder System of Monitoring Operating Parameters of a Linear Accelerator, Phys. Med. Biol., 18, No. 1, 138-141, 1973.

Wright, A. E., and Gager, L. D., Use of a Solid State Probe to Detect Changes in Operating Parameters of an 8 MV Linear Accelerator, Radiology, 105, No. 1, 201-203, October, 1972.

Gager, L. D., and Wright, A.E., Suitability of a Silicone Diode Detector for Radiological Physics Measurements, Medical Physics, Vol. 4, 494, November, 1977.

Wright, A. E., and Gager, L. D., Measurement of Dosimetry Data for High Energy Photons, Medical Physics, Vol. 4, 499, Noember, 1977

Wright, A. E., and Gager, L. D., Physical Effects of 8 MV Photons Used in Mantle Field Treatment Technique, Presented at the joint R.S.N.A.-A.A.P.M. Annual Meeting, August, 1975 (In Press, Medical Physics)

Abstracts Published

Gager, L. D., Wright, A. E., and Lee, W. C., Dose in the Building-Up Region for 8 and 10 MV X-rays, 1976. Presented at Fourth International Conference on Medical Physics, Ottawa, July, 1976.

Wright, A. E., Gager, L. D., and Lee W. C., Isodose Distribution for Mevatron 8 and Clinac 18 X-rays, 1976. Presented at Fourth International Conference on Medical Physics, Ottawa, July 1976.

BIOGRAPHICAL SKETCH

Mr. Gager was employed at the University of Texas M.D. Anderson Hospital and Tumor Research Institute in the Physics Department for a period of seven years. During this time, he was actively engaged in the calibration of radiation therapy units. The radiation-producing equipment covered a broad range of energies, consisting of an Allis Chalmers 22 MV x-ray unit, a Siemens 6-18 MeV electron beam and 18 MV x-ray unit, five Co⁶⁰ teletherapy units, and a Westinghouse 60 KV unit.

In the clinical area, he was involved in manual and computer aided planning and mapping of both interstitial and external beam radiotherapy patient treatments. These often required use of various special procedures, examples of which are protective face masks for treatment of small and/or irregular fields, and tissue-compensating filters. The construction and calibration of these devices were required. This was accomplished through measurements using standard ionization chambers and thermoluminescent dosimeters in phantoms and on patients.

Mr. Gager's duties included tutorial instruction of radiotherapy residents and training of students in the medical physics program.

In March 1971, Mr. Gager was employed as Assistant in Physics at Baylor College of Medicine Radiology Department with approximately half of his time devoted to the Methodist Hospital Radiotherapy Department.

His duties have included those listed above as well as having actively participated in the maintenance, engineering design modifications, dose calibration and measurement of absorbed dose distribution patterns of an automatic scanner and silicon diode probe in monitoring the various machine parameters indicative of the microwave energy. Research and development work in modifying the probe to make it suitable for the above task formed the basis of a thesis entitled, "Suitability of the Silicon Diode Detector for Radiological Physics Measurements," for which he was awarded a Master of Science. He was certified in Radiological Physics by the American Board of Radiology in 1978 at which time he became a diplomate of the American College of Radiology.

The American Board of Radiology

*Organized through the cooperation of the
American College of Radiology, the American Roentgen Ray Society,
the American Radium Society, the Radiological Society of North America,
the Section on Radiology of the American Medical Association
and the American Society of Therapeutic Radiologists
Hereby certifies that*

L. David Gager, M.S.

*Has pursued an accepted course of graduate study
and clinical work, has met certain standards and qualifications and
has passed the examinations conducted under the authority of*

The American Board of Radiology

On this ninth day of June, 1978

*Thereby demonstrating to the satisfaction of the Board
that he is qualified to practice the specialty of*

Therapeutic Radiological Physics

Sidney W. Nelson
President

C. Allen Good
Secretary



He presently occupies a position as Assistant Professor on the faculty of Baylor College of Medicine and chief of the radiotherapy physics group at the Methodist Hospital and Baylor College of Medicine. He is responsible for training of radiotherapy residents and radiotherapy technologists in the areas of Radiological Physics and Radiation Biology.

Mr. Gager was personally responsible for the initial design and layout of several radiotherapy departments in the Houston, Texas area. He also accomplished the design and radiation shielding calculations for several Cobalt-60 and Linear Accelerator Rooms. He has served as the medical physicist in charge for the initial commissioning for patient treatment of Cobalt-60 and Linear Accelerator therapy machines in the southern United States and Latin America.

In 1977 Mr. Gager was the principal individual responsible for the founding of the Baylor College of Medicine School of Radiation Therapy Technology. He now serves this program in the role of Assistant Director.

At present, Mr. Gager supervises a staff of three medical physicists, three dosimetrists and several equipment maintenance engineers, being involved in daily treatment of approximately 300 cancer patients, treated at radiotherapy facilities in Houston, Texas. Treatment equipment found in these facilities include: Siemen's MV77 and MV74 (x-ray and electron beam modalities), Varian 4Mv x-ray linear accelerators, seven Cobalt-60 units, superficial and ortho voltage units, Oldef and AECL treatment simulators, GE-RTPLAN, Rad-8, Techtronix, and P.C. Treatment Planning Computer systems. Also used for radiotherapy are isotopes of Radium, Cesium, Gold Grains, and Iridium.

Outside his professional working environment, Mr. Gager has been a board member of his local Civic Association, serving as secretary-treasurer of that organization for three years. Mr. Gager also tries to find limited time for work with local Girl Scout and Public School Parent Teacher Organizations.

78)

TRAINING AND EXPERIENCE AUTHORIZED USER OR RADIATION SAFETY OFFICER

1. NAME OF AUTHORIZED USER OR RADIATION SAFETY OFFICER Philip H. Cooper, Ph.D.			2. STATE OR TERRITORY IN WHICH LICENSED TO PRACTICE MEDICINE	
3. CERTIFICATION				
SPECIALTY BOARD A	CATEGORY B	MONTH AND YEAR CERTIFIED C		
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	University Of Rochester Brookhaven National Lab.	5	2	
b. RADIATION PROTECTION	"	5	2	
c. MATHEMATICS PERTAINING TO THE USE AND MEASUREMENT OF RADIOACTIVITY	"	6		
d. RADIATION BIOLOGY	"	3	44	
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
		See Item 5 and 7		

Item 5 Experience with Radiation

Isotope	Amt.	Location	Duration	Use
^{99m}Tc	1.5 Ci	V.A. Hospital	10 yr.	Calibration, Pharm. Prep. and Safety
^3H	5 mCi	U. Of Rochester AEC project	6 yr.	^3H Thymidine labeling of Dog Marrow Cells
^{137}Cs	100 mCi	V.A. Hospital	10 yr.	Calibration of Survey Meters
137	400 Ci	"	4 yr.	Safety surveys of sealed source
^{131}I	200 mCi	"	10 yr.	Safety surveys of patients and room cleanup
^{133}Xe	2 Ci	"	4 yr.	Safety with patient use
At. No. 3-83	100 mCi	"	10 yr	Safety program under license from 1968 to present

7.

CURRICULUM VITAE

NAME: Philip H. Cooper, Ph.D.

TITLE: Research Physicist

DATE AND PLACE OF BIRTH: February 20, 1935, Charleston, W. Virginia

EDUCATION:	University of Rochester, Rochester, N.Y.	Ph.D.	1966
	University of Rochester, Rochester, N.Y.	M.S.	1960
	Vanderbilt University, Nashville, Tenn.	B.A.	1959

EXPERIENCE:

1966-1968 U.S. AEC Post Doctoral Fellow at the Pacific Northwest Laboratories of Battelle Memorial Institute, Richland, Washington.

1968- Research Physicist, Veterans Administration Hospital, Houston, Texas. Research Instructor, Department of Experimental Biology, Baylor College of Medicine, Houston, Texas.

SOCIETIES:

Society of Nuclear Medicine
American Association of Physicists in Medicine
Health Physics Society
American Association for the Advancement of Science

APPENDIX C
INSTRUMENTATION

1. Survey meters

a. Manufacturer's name: Victoreen
Manufacturer's model number: 666
Number of instruments available: One
Minimum range: 0 mr/hr to 3 mr/hr
Maximum range: 0 mr/hr to 300R mr/hr

b. Manufacturer's name: Victoreen
Manufacturer's model number: 491
Number of instruments available: One
Ranges: 5
Minimum range: 0 mr/hr to 1 mr/hr
Maximum range: 0 mr/hr to 100 mr/hr

2. Beam-on Monitor

Manufacturer's name: Nuclear Associates Primalarm & Primalert
Manufacturer's model number: 05-434
Number of instruments available: One
Backup Battery Power Supply: Yes X No

3. Dosimetry System

a. Electrometer

Manufacturer's name: Capintec
Manufacturer's model number: 192A

b. Probes

Manufacturer's name: Capintec
Manufacturer's model number: PR-06C
Number of probes: One
Ranges: 0-1000 R

4. Other (use additional pages)

INSTRUMENTATION

1.	One Victoreen Model 666	3-300 mR/hr	Survey meter
2.	One Victoreen Model 491	0.1-100 mR/hr	Survey meter
3.	One Ludlum Model 12	0.2-600 mR/hr	Survey meter
4.	One Victoreen Model 570	1 - 250 R	Measuring
	Electrometer and Ion Chamber		

CALIBRATION OF SURVEY INSTRUMENTS

Check appropriate items.

- X 1. Survey instruments will be calibrated at least annually and following repair.
- X 2. Calibration will be performed at least at two points on each scale used for radiation protection purposes.

The two points will be located at approximately 1/3 and 2/3 of full scale. A survey instrument may be considered properly calibrated when the instrument readings are within $\pm 10\%$ of the calculated or known values for each point checked. Readings within $\pm 20\%$ are considered acceptable if a calibration chart, graph, or response factor is prepared, attached to the instrument, and used to interpret meter readings to within $\pm 10\%$ for radiation protection purposes.

3. Survey instruments will be calibrated
- a. By the manufacturer
- X b. At the licensee's facility

- (1) Using the calibration source described below:

Radionuclide Cesium - 137

Manufacturer's name Nuclear Associates

Model No. 64-764

Activity (e.g., millicuries) or exposure rate

output (e.g., R/hr at 1 meter) 100 mCi

Accuracy _____

- _____ (2) Following the calibration procedures in this appendix,
or

- X

- (3) Following the step-by-step procedures, including radiation safety procedures, that are attached.

VETERANS ADMINISTRATION MEDICAL CENTER
Nuclear Medicine Service
Houston, Texas

Procedure for calibration of survey meters

1. Survey meters will be calibrated at least annually and following repairs.
2. Calibration will be performed at two points on each scale. The two points will be approximately $1/3$ and $2/3$ of full scale. A survey meter will be considered properly calibrated when the instrument readings are within $\pm 10\%$ of the calculated or known values for each point checked. Readings within $\pm 20\%$ are acceptable if a calibration chart or graph is prepared and attached to the instrument.
3. The source used is a Nuclear Associates/Victoreen Model 64-764, Serial No. 157, that contained 100 millicuries of Cesium 137 and emitted 45 mR/hr at 30 inches on March 9, 1973.
4. For calculation of the desired mR/hr readings, the inverse square law is used and the radioactive decay law is used to obtain decay from the calibration date of the source to the date of instrument calibration.

Item 13
March, 1985



The University of Texas System Cancer Center

M. D. Anderson Hospital and Tumor Institute

Texas Medical Center • 6723 Bertner Avenue • Houston, Texas 77030

Instrument submitted by:

Department of Physics

David M. Bellezza
Veterans Administration Hospital
2002 Holcombe Blvd.
Houston, TX 77030

Page 1 of 4
Report # 84-59

ACCREDITED DOSIMETRY CALIBRATION LABORATORY

Report of Calibration

Date instrument received for calibration: May 1, 1984
Date instrument calibration completed: May 12, 1984
Date calibration report completed: May 15, 1984

Description of instrument:

Capintec Exposure/Exposure Rate Meter Model 192A, Serial # 57F174
Capintec Chamber Model PR-06C (0.6 ml, AE plastic), Serial # CII 0.6290
Polystyrene Buildup Cap, # CII 0.6290

NOTE: Proper function and reliability of the radiation measuring devices described in this document are highly dependent upon handling and use. Therefore, the duration of responsibility of The University of Texas System Cancer Center, M. D. Anderson Hospital and Tumor Institute, and its employees for the calibration results extends only to the time the instruments leave the M. D. Anderson Hospital premises. It is recommended that the instrument user establish an appropriate technique of monitoring the constancy of the instrument response before and after its submission to the Accredited Dosimetry Calibration Laboratory and on a regular basis thereafter. In addition, it is the express responsibility of the instrument user to assure himself (by personal communication, if necessary) that his interpretation of the information in this document is consistent with the interpretation intended by the Accredited Dosimetry Calibration Laboratory.



1836-1986
The University of Texas System

Item 13
March, 1985

ACCREDITED DOSIMETRY CALIBRATION LABORATORY
M. D. ANDERSON HOSPITAL AND TUMOR INSTITUTEPage 2 of 4
Report # 84-59CALIBRATION FACTORS:

R/rdg: Roentgen/reading calibration factors apply to the chamber-electrometer-readout system as a unit, with scales, switch settings and output mode specified. To obtain the exposure in roentgens at the geometrical center of the ion chamber volume*, in the absence of the chamber, the calibration factor is applied directly to the instrument reading corrected for temperature and pressure.

R/C: Roentgen/coulomb calibration factors apply to the ion chamber alone. To obtain the exposure in roentgens at the geometrical center of the ion chamber volume*, in the absence of the chamber, an appropriately calibrated (coulomb/reading) electrometer must be used.

TEMPERATURE-PRESSURE CORRECTION FACTOR:

For chambers open to the atmosphere, the instrument readings were normalized to 760 millimeters of mercury and 22 degrees Celsius. Use of the chamber at other pressures and temperatures requires correction by the following multiplicative factor:

$$\frac{T + 273.15}{295.15} \times \frac{760}{P}$$

where T is the temperature in degrees Celsius, and P is the chamber pressure in millimeters of mercury.

No corrections were made for air humidity.

CALIBRATION CONDITIONS:

Calibration field size is given by the dimension across the field from one 50-percent intensity line to the other (in air) measured at the calibration distance. Stem effect was not investigated; the calibration factor applies only to the field size stated.

During calibration the chamber was centered in the beam with the stem perpendicular to the beam direction, except for end-window chambers which are calibrated with the stem parallel to the beam direction.

The sign of the polarizing voltage indicates the thimble potential relative to the collecting electrode, although the thimble may actually be grounded.

The exposure rate at the calibration position was measured with a transfer-quality ionization chamber which was calibrated at the National Bureau of Standards.

The overall accuracy of the calibration factors assigned by the Accredited Dosimetry Calibration Laboratory is believed to be within 2.5%, which includes the uncertainty inherent in the determination of the roentgen.

BEAM QUALITY:

Medium energy x-ray beam quality is described in terms of the first half-value thickness in millimeters of aluminum or copper, the ratio of the first to the second half-value thickness, and the peak kilovoltage.

The half-value thicknesses were determined with a 2 cm diameter aperture and high purity aluminum or copper absorbers. The aperture and ion chamber were positioned at 50 cm and 100 cm, respectively, from the target.

*The measurement position of end-window chambers is normally designated by a circular groove.

ACCREDITED DOSIMETRY CALIBRATION LABORATORY
M. D. ANDERSON HOSPITAL AND TUMOR INSTITUTE

Report of Calibration

INSTRUMENT:

Capintec Chamber Model PR-06C (0.6 ml, AE plastic), Serial # CII 0.6290
Polystyrene Buildup Cap, # CII 0.6290 (Cobalt-60 radiation only)

SCALES, SWITCH POSITIONS, AND CONDITIONS:

Field Size: $10 \times 10 \text{ cm}^2$ Preirrad. Leakage: $1 \times 10^{-15} \text{ A}$

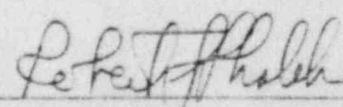
Chamber Only

Orientation: Air hole toward beam

Nominal Full Scale: N/A

Polarizing Voltage: -312.7 V
(on thimble) $A_{\text{ion}} = 0.999$ (reducing polarizing potential to $\frac{1}{2}$, did alter the amount of charge collected.

BEAM QUALITY			EXPOSURE RATE (R/min)	CALIBRATION* FACTOR (R/C)	% FULL SCALE or (Total Exposure)
HVT(mm)	1st/2nd	kVp			
2.37 Al	0.58	100	50	$4.73_3 \times 10^9$	N/A
1.83 Cu	0.64	250	56	$4.88_3 \times 10^9$	N/A
2.97 Cu	0.86	250	30	$4.90_3 \times 10^9$	N/A
<hr/>					
Cobalt-60			27	$4.98_6 \times 10^9$	N/A

*At 22°C, 760 mmHg: The chamber was determined to be open to atmospheric communication.DATA BOOK 20,18 ; PAGE(s) 43,232

 Robert J. Shalek

ACCREDITED DOSIMETRY CALIBRATION LABORATORY
M. D. ANDERSON HOSPITAL AND TUMOR INSTITUTE

Report of Calibration

INSTRUMENT:

Capintec Exposure/Exposure Rate Meter Model 192A, Serial # 57F174

SCALES, SWITCH POSITIONS, AND CONDITIONS:

Electrometer Switch: Position

PROBE SELECTOR: ELECTROMETER
COMPENSATION FACTOR: 1.00
METER RANGE: NORMAL } (199.9 full scale)
EXPOSURE LEVEL: HIGH }
MODE: TOTAL

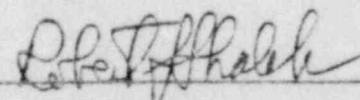
NOTE: ZERO ADJUST and BACKGROUND were adjusted in accordance with the Capintec 192 Operation Manual. However, any zero offset or zero drift should be taken into account, if significant to the reading being taken.

CHARGE CALIBRATION FACTOR:

$$0.859 \times 10^{-9} \text{ C/rdg}$$

NOTE: The charge sensitivity (rdg/C) was constant to within + 0.1% or the precision of reading (whichever is greater) over the range of readings from +46.6 to +199.5.

EXAMPLE: Assume that the chamber described on page 3 is being used with the electrometer and switch settings described above, that the temperature-pressure correction is 1.000, and that the reading is 100.0 (i.e. 50% full scale); then the exposure for Cobalt-60 radiation would be $100.0 \times 4.986 \times 10^{(+9)} \times 0.859 \times 10^{(-9)} = 428.3 \text{ R}$. Nominal full scale is 856 R.

DATA BOOK 19; PAGE 103

Robert J. Shalek