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allegheny health, education and research corporation

Subsidiaries:
Allegheny General Hospital
Allegheny-Singer Research Corporation

320 East North Avenue
Pittsburgh, Pennsylvania 15212-9986
412-359-3001

Office of the President
John H. Westerman

March 20, 1984

'84 MAR 27 P3:17

Patricia C. Vacca
Materials Licensing Branch
Division of Fuel Cycle & Material Safety
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

RE: Reply to Your Request for Additional Information
Docket No. 030-00462
License No. 37-01317-02
Control No. 16075
Licensee: Allegheny Health, Education and Research Corporation

Dear Ms. Vacca:

In response to your letters dated March 6, 1984, and January 16, 1984, requesting additional information regarding our October 11, 1983, request for license amendment this letter is sent. You'll note that the numbering format used in this communication is organized to correspond to the numbering format of your January 19, 1984, letter. We have an addition to be included with this licensing request, and it is as follows.

We would like to include the name of Phocheng Cheng, Ph.D. to our current list of authorized users for non-human use of licensed material. Such authorization for non-human use would permit Dr. Cheng to use or to supervise the use of our Co-60 teletherapy units.

This request has been reviewed and approved by our Radiation Safety Committee.

We hope that the enclosed information will enable you to finalize the processing of our request for amendment but should any questions arise, please feel free to contact Frank P. Ottino, M.Sc., or Prakash N. Shrivastava, Ph.D., at (412) 359-3485.

Sincerely,

John H Westerman

John H. Westerman

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JHW:dls
Enclosure

"OFFICIAL RECORD COPY"

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COPY SENT REGION 1

1. Current (Correct) Mailing Address:

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

2. The Picker Model 6296 Human Use teletherapy unit is located at Allegheny Health Education & Research Corporation, 320 East North Avenue, Pittsburgh, PA 15212. Allegheny Health Education & Research Corporation is known publicly as Allegheny General Hospial. The teletherapy facility is located in the North West Wing of the hospital on the -02 Level which means the teletherapy unit is at least two (2) floors below ground level. The North West wing is contiguous with both the hospital's older Main Tower and its original wings as well as with the newest 750 bed hospital building. Thus the older main tower and its original wings, the intermediate wings (e.g., North West wing which houses the Picker Model 6269) and the 1982 hospital building are all internally connected and all share the same mailing address, 320 East North Avenue, Pittsburgh, PA 15212.

   In Summary: The Picker Model 6296 teletherapy location is as follows:

Street:	320 East North Avenue Pittsburgh, PA 15212
Building Name:	Allegheny General Hospital
Wing Name:	North West Wing
Floor:	-02; Meaning 2 floors below ground level
Room Number:	02-D-200

3.

   a. In discussing our proposed uses of the Co-60 A.E.C.L. tele-calibration source and apparatus we chose the words "principally for the calibration of customers dosimetry systems." The word 'principally' implies that in addition to contracted calibrations we would also like to be permitted to use the Co-60 tele-calibration facility for the following proposed uses:

i. Calibration of our own dosimetry systems.

ii. Beam "On Time" for quality assurance procedures involving the operating techniques typically used during the protocols for calibrating dosimetry systems.

iii. Irradiation of animals, tissues,cells, etc., related to our hospital's numerous and diverse research laboratories.

iv. Beam "On Time" for Radiation Safety Surveys and Analysis.

It should be mentioned that all uses would be strictly limited to non-human uses.

b. The Co-60 tele-calibration facility is to function to calibrate dosimetry systems used to make full calibration measurements required by 10-CFR-35.21.

i. Our proposed facility and protocols have been provisionally accredited by the A.A.P.M. (See Attachment).

ii. See the attached copy of the certificate of calibration provided to our customers.

c. Customer calibrations, as of yet, will be limited to dosimetry systems. If in the future the calibration of portable survey meters is considered, a certificate of calibration will be forwarded to the NRC.

4.

a. Entrance Doors' Interlocks:

As you have noted in Question No. 4. there are two separate doors permitting access to the High Radiation Area of the calibration facility. Each door is independently wired to terminate the "On" beam and return the source to the "Off" condition. Thus at any time that either door is opened the beam will terminate and a mandatory reset sequence at the control panel will be a prerequesite for producing a subsequent "On" beam condition. Also, if either door is open at the time of the reset sequence the Co-60 source **can** NOT be exposed until each door is closed.

These interlocks and mandatory control panel reset sequence will be tested for proper function semi-annually and records of these tests will be maintained by the Radiation Protection Office for review by NRC inspectors.

b. Showing compliance with 10-CFR-20.203 (C) (6)

i. Controlled access to and from the High Radiation Area will be accomplished through the use of entrance door interlocks. These interlocks are spring loaded switches which are depressed upon the complete closing of the entrance doors. Each door will have such an interlock. These interlocks will in no way prevent an individual located inside the High Radiation Area from leaving this area. If an interlock is broken, either entrance door being opened, the Co-60 source would be returned to it's beam off position and radiation levels at a meter from the teletherapy head would be less than 2 mR/hr on the average.

ii. In the event that the door interlocks would fail to return the Co-60 source to the off position or an individual was inside the High Radiation Area during an "On" beam condition the Co-60 tele-calibration unit is wired to an emergency scram button which functions to return the Cobalt unit to its "Off" position. This emergency shut down button is conveniently located on the south wall immediately adjacent to the entrance door; it is labeled with a sign which states "Emergency Scram Button" and is colored bright red.

iv. In order to notify individuals whom might be present in the calibration room that all conditions have been met to expose the high radiation source a bright visible red flashing light will be used. This light will be interlocked to the entrance doors with micro-switches such that when both doors are closed the warning light will be turned on. A sign will be posted under the large flashing light stating: "High Radiation Alert, Immediately Evacuate Area When Light Is Flashing".

iv. A continuously operating source status monitor will be conspicuously installed so to indicate to an individual entering this High Radiation Area whether the radiation levels are safe. Sensitivity (threshold) surveys will be conducted at least annually and after each repair of the monitor to assure its proper function. Typical Threshold of a positive beam signal would occur from 5-10 mR/hr.

viii. Does not apply, i.e., there are no portals.

vii. Prior to initiation of the calibration operation and each day thereafter when the Co-60 tele-calibration source is exposed a check will be conducted to determine if the entrance interlocks are properly functioning to terminate the "On" beam status. Records of this on going safety check will be maintained for NRC review.

5. Prevention of Unauthorized Personnel Use

The use of the Co-60 tele-calibration unit is dependent upon a key turn on. The key for the control panel will be controlled and a copy will be issued to only the following individuals:

a. Phocheng Cheng (Proposed Authorized User), Supervisor of the A.D.C.L.

b. Prakash N. Shrivastava, Ph.D., (Authorized User), Director of Medical Physics and Engineering Department which includes the A.D.C.L.

c. Frank P. Ottino, M.Sc., (Authorized User), Radiation Protection Office.

Emergency Procedures

I. A Cobalt Emergency Is:

1. Breakdown of any part of the teletherapy head, source or mechanism involving the source; or,

2. Red "On" beam lights remain on when clock is off and/or entrance door interlocks are broke. Red lights are on the Control Panel, on Cobalt apparatus, above door, and as indicated by independent radiation monitor.

II. Actions To Be Taken in the event of an emergency:

1. Turn key to "Off" position. If beam remains on, turn off main electrical switches.

   WARNING: Avoid exposure to the primary beam; do not remain in the high radiation area any longer than is absolutely necessary while beam is "On".

2. If beam remains "On":

   A. Immediately inform the Radiation Protection Office.

   B. Enter the room to a position behind the tele-calibration head. Manually close the shutter block.

3. Evacuate the room and lock both entrances making sure that no one remains inside. Do not allow anyone to enter the room.

4. Inform the following individuals:

A.	Frank P. Ottino, M.Sc.	Ext. 3485 or Page
B.	Prakash Shrivastava, Ph.D.	Ext. 4171
C.	Phocheng Cheng, Ph.D.	Ext. 3189
D.	A.E.C.L.	215-441-5353 or 613-592-2790

7. Two of the current non-human use authorized users have offices less than 20 feet from the control panel of the Cobalt-60 unit. Thus at least one of these two authorized users would be present during the operation of the calibration lab. In order to be absolutely sure that at least one authorized user is physically present during the operation of the Cobalt tele-calibration unit we would also like to add the name of Dr. Phocheng Cheng, Ph.D., as an authorized user of the Co-60 teletherapy unit for non-human uses. As proof of Dr. Cheng's experience and training regarding the safe use of radiation sources a copy of his Curriculum Vitae is enclosed.

8. Item 15. Beam Stops

The Co-60 tele-calibration unit will be operated in only one direction. The Co-60 beam will be aligned directly into the cavity of the primary beam stopper. In order to achieve this orientation the head will be angled forward 90^{o} so that the primary beam is propagating parallel with respect to the floor and at a perpendicular 90^{o} angle with respect to the east wall. This beam of course will only strike the east wall after passing through the 21 HVLs afforded by the primary beam stopper.

The tele-calibration head housing the Co-60 source will not be moved (rotated, swiveled, revolved or angled) in any direction unless for purposes of :

a. replacement/removal of the Co-60 source by a certified Co-60 maintenance expert, i.e., A.E.C.L. service.

b. for radiation safety reasons, i.e., positioning shielding, more precisely directing beam into the primary beam-stopper, etc.

c. Fine tuning the beam orientation for enhancing the precision of the calibration process.

It should be noted that all movements of the tele-calibration head will be with the beam in the "Off" position and all alignment procedures will use the light field of the Co-60 apparatus. In all cases the general orientation of the head will be as described above; that is, the head rotated 90^{o} towards the east wall so that the beam is directed horizontally and parallel with respect to the floor and perpendicularly towards the east wall while passing directly into the cavity of the primary beam stopper.

CURRICULUM VITAE

NAME: Pocheng Cheng

OFFICE ADDRESS: Division of Radiation Oncology
Wisconsin Clinical Cancer Center, K4/B100
University of Wisconsin Hospitals
600 Highland Avenue
Madison, Wisconsin 53792
Telephone: 608-263-8619

HOME ADDRESS: 944 B Eagle Heights
Madison, Wisconsin 53705
Telephone: 608-233-4416.

SOCIAL SECURITY NO: 201-52-3352

DATE OF BIRTH: May 30, 1948

MARITAL STATUS: Married

CHILDREN: One Daughter (4 years old)

EDUCATION: Ph.D. Degree in Radiological Science, 1978-Sept. 1982
University of Wisconsin-Madison, Wisconsin
Thesis: "Experimental Verification and Refinement of the Projective Photon Beam Model and Extension to Electron and Neutron Beams for Radiation Therapy Computerized Treatment Planning"

M. S. Degree in Radiological Science, 1976-1978
University of Wisconsin-Madison, Wisconsin

M.S. Degree in Physical, 1974-1976
Temple University, Philsdelphia, PA

Second Lieutenant, Mechanic Office in 61st Arsenal
Taipei, Republic of China 1972-1974

B.S. Degree in Physics, 1968-1972
Tunghai University in Taiwan, Republic of Chna

HONORS:

1974-1975 Fellowship in Department of Physics at Temple University

1975-1976 Teaching Assistantship in Department of Physics at Temple University

1976-current Research Assistantship in Department of Human Oncology at University of Wisconsin

SOCIETIES: Junior Member of American Association of Physicists in Medicine

EXPERIENCES: Measurements and characterizations of absorbed dose distributions for AECL Eldorado Cobalt-60, Varian's Clinac-4 and Clinac-18, and Siemens' Mevatron VI and Mevatron XII radiation machines for both photon and electron beams. Based on these data I studied and improved the van de Geijn's photon beam model, and extended this beam model to be suitable for electron beams for a computerized treatment planning system. I also implemented the basic beam data of these radiation machines into a treatment planning program for patient treatments at both Radiotherapy Center, University of Wisconsin Hospitals, and Radiation Oncology Branch, National Cancer Institute, NIH, Bethesda, Maryland.

From investigations of the Fermilab neutron beam data I also extended this beam model to fast neutron beams. Currently, part of this beam model was implemented in the computerized treatment planning system at the Fermilab Neutron Therapy Facility, Batavia, Illinois.

Calibration checks and quality assurance for Eldorado Cobalt-60, Clinac-4 and Clinac-18 linear accelerators at Radiotherapy Center, University of Wisconsin Hospitals.

Set-up a compensator system for Clinac-4 and Mevatron VI linear accelerators in Medical College of Wisconsin, Milwaukee, Wisconsin.

Clinical training and experience in quality assurance testing of diagnostic equipment at Diagnostic Department, University of Wisconsin Hospitals.

PUBLICATIONS:

F. H. Attix, D. W. Peterson, Pocheng Cheng, B. Paliwal: Cavity Ionization Produced by 14.8 MeV Neutrons in Ion Chambers of TE Plastic, Graphite, and Magnesium Containing TE gas, CO_2, and air. Fast Neutron Dosimetry Report #COO-1105-250, University of Wisconsin, 1977

B. Paliwal, Pocheng Cheng, A. J. Greenberg, A. L. Wiley: A Technique to Improve the Homogeneity of Electron Dose in Chest Wall Irradiation. INT. J. RADIATION ONCOLOGY BIOLOGY AND PHYSICS Vol. 5, 1889-1892, 1979

B. R. Thomadsen, L. W. Asp, J. van de Geijn, B. R. Paliwal Pocheng Cheng: Pertubation of Electron Beam Doses as a Function of SSD Due to the Use of Shielding Block on the Clinac-18. Medical Physics, Vol. 8, 507-509, 1981

J. van de Geijn, Pocheng Cheng: The Variation of Cross-Beam Profile with Depth, Aperture and SSD in High Energy Photon Beams. Wisc. Med. Physics Report #119

PRESENTATIONS:

B. R. Paliwal, F. H. Attix, Pocheng Cheng: A Tissue Equivalent Solis Water. AAPM Annual Congress, Atlanta, August, 1979

J. van de Geijn, Pocheng Cheng: Extension of the Quasi-Projective Beam Model to Fast Neutron Beam. AAPM Annual Congress, Atlanta, August, 1979

J. van de Geijn, Pocheng Cheng: The Variation of Cross-Beam Dose Profile with Depth, Aperture and SSD, in High Energy Photon Beam. Annual Meeting RSNA, Atlanta, November, 1979

J. van de Geijn, Pocheng Cheng: Projective Properties in Cross-Beam Dose Profiles in Photon Beams and Electron Beams. Annual Meeting RSNA, Atlanta, Nov. 1979

J. van de Geijn, Pocheng Cheng: Generalization of the Power Law Method to Include Inhomogeneities of Smaller Than Beam Cross Section. AAPM Annual Meeting, Mineapolis, July, 1980

J. van de Geijn, Pocheng Cheng: Variation of Cross-Beam Dose Profile Due to the Presence of Inhomogenesity in Photon Beams. AAPM Annual Meeting, Minneapolis, July, 1980

J. van de Geijn, I-chu Chien, Pocheng Cheng, H. A. Frederickson: A Unified 3-D Model for External Beam Dose Distributions. Proceeding of the 7th ICCR, Tokyo, Japan, September, 1980

J. van de Geijn, Pocheng Cheng: The Net Fractional Depth Dose (NFD); Concept, Physical Properties and Computational Advantages. AAPM Annual Meeting, Boston, August, 1981

J. van de Geijn, Pocheng Cheng: The Use of the Projective Beam Model for Moving Electron Beams. Electron Dosimetry and Arc Therapy Symposium, University of Wisconsin, Madison, September, 1981

REFERENCES:

Dr. Bhudatt R. Paliwal
Director, Physics Section of Radiation Therapy
Wisconsin Clinical Cancer Center, K4/B43
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600 Highland Avenue
Madison, Wisconsin 53792
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Physisist, Radiation Therapy
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University of Wisconsin Hospitals
600 Highland Avenue
Madison, Wisconsin 53792
Telephone: 608-263-8500

Dr. F. Herb Attix
Professor, Medical Physics
1475 Medical Sciences Center
1300 University Avenue
Madison, Wisconsin 53706
Telephone: 608-262-3527

AMERICAN ASSOCIATION OF PHYSICISTS IN MEDICINE

OFFICE OF THE PRESIDENT
Nagalingam Suntharalingam, Ph.D.
Thomas Jefferson University
Radiation Therapy Department
11th & Walnut Streets
Philadelphia, PA 19107
(215) 928-8855

September 1, 1983

Prakash Shrivastava, Ph.D.
Director, Calibration Laboratory
Allegheny Singer Research Corporation
Allegheny General Hospital
320 East North Avenue
Pittsburgh, PA 15212

Re: Provisional AAPM Accreditation of
Dosimetry Calibration Laboratory

Dear Prakash,

The Board of Directors at their meeting on August 4, 1983 has approved the Allegheny Singer Research Corporation located at Allegheny General Hospital as a provisional Accredited Calibration Dosimetry Laboratory. An announcement to our membership will be made in the near future concerning this action.

Please be informed that it is necessary for you as Director of the ACDL to keep the Chairman of Task Group #3 of the Radiation Therapy Committee apprised of all developments in your laboratory.

The Board of Directors is pleased to grant this provisional accreditation. We look forward to your active performance in this calibration service and hope you will meet the requirements for full accreditation at the end of the one year period.

Wishing you and your group all the best in this new program.

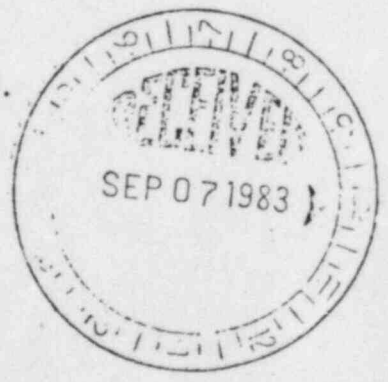
Kind personal regards.

Yours sincerely,

N. Suntharalingam, Ph.D.

NS: mjp

cc: Peter Almond
James Purdy
Marty Rozenfeld



ACCREDITED DOSIMETRY CALIBRATION LABORATORY*

Allegheny Singer Research Corporation
Allegheny General Hospital
320 East North Avenue
Pittsburgh, PA 15212-9986

REPORT OF ADCL CALIBRATION

Report No.: 42 No. of Pages: 6 Date: Feb. 15, 1984

INSTRUMENTS:

Submitted by: Dr. William G. Keough
Medical Radiation Physics Inc.
P.O. Box 7000 - 158
Palos Verdes, CA 90274

Date Received: Feb. 7, 1984 Date Calibrated: Feb. 14, 1984

	Ionization Chamber	Electrometer
Manufacturer:	Capintec	Capintec
Model No.:	PR-06C	192
Serial No.:	.62633	8NC703
Size:	0.6 CC	
Build-up Cap:	Cobalt-60	

SERVICES PERFORMED:

3A Integrated dosimeter calibration (Cobalt-60).

*Accredited by the American Association of Physicists in Medicine
August 4, 1983

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RESPONSIBLITIES

Sensitivity of radiation measuring instruments can be altered by unsuspected trauma during routine use or transportation. Therefore, Allegheny Singer Research Corporation and its employees cannot assume the responsibility for calibration accuracy after instruments leave our calibration laboratory. To ensure reliability we suggest that the instrument user check constancy of instrument response before and after submission to the Dosimetery Calibration Laboratory and monitor it on a regular basis thereafter. In addition, the user must assume the responsibility to verify that his interpretation of information in this document is consistent with the intent of the Dosimetry Calibration Laboratory. In case of any doubt, we encourage personal communication with laboratory personnel.

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CALIBRATION REPORT FOR INTEGRATED DOSIMETER

EXPLANATIONS:

1. Correction Factors for Integrated Dosimeters:

NBS traceable correction factor for integrated dosimeters (i.e. integrated ion chamber and electrometer systems or those which read in units other than coulombs) are given in this report as dimensionless numbers. They are quotients of the x or gamma ray exposure (R) and the reading generated by that radiation in the instrument submitted for calibration.

The exposure at the calibration position was measured with a reference class ion chamber and electrometer calibrated at the U.S. National Bureau of Standards.

The instrument reading was measured with the collection potential set to the user requested polarity and magnitude. A check was made to see that halving the collection potential did not reduce charge collection efficiency (> 5%). Leakage of the chamber with its associated electrometer was measured and, if necessary, correction was applied as reported. Chambers were tested to ensure air communication and their measurements normalized to air at 760 mm of Hg pressure and 22° C temperature.

To determine radiation exposure (R) with this instrument when the instrument is used such that air in its cavity is at some other pressure (P mm of Hg) and temperature (T° C), its reading should be multiplied by the reported correction factor and also the pressure-temperature factor F.

$$F = \frac{(273.15 + T)}{295.15} \times \frac{760}{P}$$

This procedure is strictly valid only under irradiation conditions specified in this report. Appropriate use under other radiation conditions is the responsibility of the user.

2. Atmospheric Communication:

All chambers are tested to ensure atmospheric communication. Presently we do not calibrate sealed instruments or those that fail the air communication test.

3. Leakage:

Integrated instrument leakage is checked five minutes after applying collection voltage to the collector and guard. The instrument is not calibrated if leakage effect exceeds 0.5%.

4. ADCL Exposure Conditions:

Cobalt-60 beam calibrations are normally carried out in 10 x 10 cm^2 beam with the chamber 80 cm from the source. The ion chamber is centered in the beam with its stem perpendicular to the beam direction. Stem effects are not checked unless specifically requested.

The ADCL exposure measurements are reproducible to a few tenths percent.

5. Calibration Accuracy:

Accreditation of this dosimetry calibration laboratory requires that we maintain an overall accuracy of $\pm$ 0.5% for calibration of field class instruments in Cobalt-60 beams and $\pm$ 2% in x-ray beams. We have paid careful attention to be well within these limits during calibration of your instrument.

Further explanation on technical aspects of this report may be obtained by contacting Pocheng Cheng, Ph.D., at (412) 359-3189 or Homer Holloway, Ph.D., at (412) 359-4421.

P N Shrivastava

Prakash N. Shrivastava, Ph.D., Director
Dosimetry Calibration Laboratory

ACCREDITED DOSIMETRY CALIBRATION LABORATORY

Allegheny Singer Research Corporation
Allegheny General Hospital
320 East North Avenue
Pittsburgh, PA 15212-9986

RESULT OF CALIBRATION FOR INTEGRATED DOSIMETER

INSTRUMENTS:	Ionization Chamber	Electrometer
Manufacturer:	Capintec	Capintec
Model No.:	PR-06C	192
Serial No.:	.62633	8NC703
Size:	0.6 CC	
Build-up Cap:	Cobalt-60	

Field Size: 10 x 10 cm @ 80 cm

Orientation: The chamber stem was perpendicular to the beam with the serial number facing the radation source.

Collection Voltage: + 306 V (on center electrode)

BEAM QUALITY	EXPOSURE RATE (R/min)	CORRECTION* FACTOR
^{60}Co	113.4 on 1/1/83	1.005

*At 22^{o} C, 760 mm Hg, and switch positions on the electrometer as follows:

Probe Selector:	A
Exposure Level:	High
Meter Range:	Normal
Mode:	Total
Compensation Factor:	1.00
Bias Voltage:	+ 300

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1. The chamber was determined to be open to atmospheric communications.

2. Five minutes after the chamber was connected to the electrometer, the instrument leakage current was less than 0.05 R/min with the electrometer setting on A, High, Normal, Total, + 300 V and x 1.00.

3. 0.997 was the ratio of the charge collected at collection voltages of + 152 V and + 306 V respectively. A detailed saturation study was not carried out and no correction for lack of saturation was applied to the data.

DATA BOOK NO.: 2

PAGE(s): 96, 97, 100 and 101 - 103

Calibration Performed By

Reviewed By