University of Pittsburgh

Radiation Safety Office

Room G-7 Parran Hall
Pittsburgh, Pennsylvania 15261
412-624-2728, 2729
Fax: 412-624-3562

Br. 1

October 10, 2005

Licensing Section
Nuclear Materials Safety Branch
U.S. Nuclear Regulatory Commission, Region I
475 Allendale Road
King of Prussia, PA 19406-1415

RECEIVED
2005 OCT 11 P 1:53

Re: Amendment Request to License No. 37-00245-09 03029418

Dear Sir or Madam:

We request the addition of Jack Bhatnagar, Ph.D. in the position of a medical physicist to the Gamma Knife License held by the University of Pittsburgh. Dr. Bhatnagar was most recently associated with West Virginia University Hospital. He was named as a medical physicist on the gamma knife license held by that hospital. A copy of that license issued by the NRC is attached; as are copies of his curriculum vitae and certification.

If you have any question or require additional information, please do not hesitate to contact us.

Very truly yours,

Niel Wald

Niel Wald, M.D.
Chairman, Radiation Safety Committee

Attachment:

13786H
NMSS/RGNI MATERIALS-002

8890 Willoughby Road
Pittsburgh, PA 15237

412/366-3022
ushabf@aol.com

Jagdish P. Bhatnagar, Sc. D., F.A.C.R

Certifications and Fellowship

- American Board of Radiology, Radiological Physics, (1977)
- American Board of Medical Physics, Physics of Radiation Oncology (1989)
- Fellow of the American College of Radiology (1988)

Experience

2002 -Present West Virginia University Hospitals and School of Medicine, Morgantown, WV

Associate Professor, Department of Radiology

In West Virginia University Department of Radiology, Section of Medical Physics, I am involved in all areas of medical physics. Following is a brief outline of experience in each area:

Radiation Oncology Department

- *GAMMA KNIFE*

(a) Completed initial acceptance testing and calibration of Leksell Gamma Knife (Model C). I am an authorized Medical Physicist on WVU Gamma Knife NRC license.
(b) Established routine annual and monthly calibration procedures for Gamma Knife and conducting these tests.
(c) Treating patients on Gamma Knife with radiation oncologist and neurosurgeon.
(d) Calculated shielding requirements for a unique Gamma Knife vault design with skylight and conducted radiation safety survey of the installation.

- *HDR*

(a) Calibrating new sources of Ir-192 for Nucletron-Microselectron HDR unit on a quarterly basis.
(b) Conducting routine safety and QC checks before treatment with HDR unit.
(c) Doing treatment planning for HDR patients and executing HDR treatments with radiation oncologist.

- *LDR*

(a) I have used all sorts of LDR sources including I-125 and Pd-103 seeds for prostate implants and doing pre and post implant dosimetry using VeriSeed and Prowess soft-wares.
(b) Ir-192 ribbons and Cs-137 sources for a variety of applications, e.g., Syed applicators, Fletcher-Suit applicator, Delclos applicator. etc.

- *CARDIAC INTRAVASCULAR BRACHYTHERAPY*

(a) Calibrating Novoste IVBT Sr-90 source trains.
(b) Assisting radiation oncologist in the treatment of Cardiac patients with stent placement for restenosis in Cath Lab.

- *IMRT*

(a) Doing IMRT treatment planning on Varian Eclips treatment planning system.
(b) Validating IMRT treatment plans using Kodak EDR2 films and RIT113 film dosimetry system.
(c) Familiar with Varian Varis record and verify system.

- *COMMISSIONING AND CALIBRATION OF ACCELERATORS*

(a) Commissioned and calibrated Varian 21 EX-S accelerators.
(b) Calibration done as per TG-21 and TG-51 protocols.
(c) Annual and monthly calibration of accelerators.

- *CHART CHECKS AND HAND VERIFICATION OF COMPUTER GENERATED MONITOR UNITS*

(a) On a weekly basis checking charts of all patients under treatment for accuracy of dose delivery.
(b) Verifying by hand calculations the treatment monitor units, which are provided by the treatment planning system.

- *IN-VIVO DOSIMETRY*

(a) By MOSFET dosimeters, and
(b) By diodes

Diagnostic Radiology Department

(a) MQSA required medical physicist's surveys of mammographic units.
(b) Calibration of fluoroscopic and radiographic x-ray units.
(c) Calibration and accreditation of CT-scanners, and MRI units.
(d) Fetal and patient dose estimates.
(e) Fluoroscopic check of all lead-protective apparel.
(f) Fetal and patient dose estimates.

Nuclear Medicine Department

(a) QC testing of gamma cameras, uptake probes and dose calibrators.
(b) Quarterly linearity check of dose calibrators.
(c) Quarterly surveys of nuclear medicine lab.
(d) Leak-testing of sealed sources.
(e) Dosimetry of experimental radioactive drug therapies.

Teaching Experience

(a) Teaching radiological physics, radiation biology and radiation safety to radiology residents. Instructions required about 100 hours of didactic and laboratory instructions each year.

(b) Teaching X-ray, Ultrasound, Nuclear Medicine , and Radiation Therapy technology students.

1975 – 2002 Pittsburgh Mercy Health System Pittsburgh, PA

Director, Division of Radiation Physics

Radiation oncology department (From 1975 to 1995):

(a) Initial acceptance testing and calibration of Siemens KDS2, Mevatron 74, Varian 2100, and Varian Clinac-4 accelerators, annual and monthly calibrations of accelerators, establishing routine QC procedures for accelerators using AAPM TG-40 report, and chart checks.

(b) Initial acceptance testing and calibration of Co-60 unit (AECL Theraton-80).

(c) Calibration of contact and superficial therapy x-ray units (Philips RT-100).

(d) LDR brachyterapy for prostate seed implants, Syed applicators, Fletcher-Suit applicators, Delclos applicators.

(e) Calculation of equivalent treatment regimens using biological damage and repair models.

(f) Developed several treatment techniques with extensive experimental dosimetry. Some of these techniques are: pseudo electron beam arc for treating curved surfaces, total skin electron beam (TSEB) irradiation for mycosis fungoids and lymphoma cutis, and staggered strip technique for whole abdominal irradiation.

(g) Participated in E.C.O.G. and R.T.O.G. protocols.

- **Diagnostic radiology & Nuclear Medicine departments:**

  Same duties as outlined above in the present position.

- **Radiation Safety Officer:**

  (a) Radiation Safety Officer on Pittsburgh Mercy Health System NRC and State radioactive material licenses.

  (b) Developed policies and procedures for radiation safety.

  (c) Acquiring NRC and State radioactive material licenses.

  (d) Amending NRC and State radioactive material licenses.

(e) Implementing and compliance with NRC and State regulations.
(f) Personnel monitoring of radiation workers.
(g) Surveys of radioactive labs and high energy accelerators.
(h) Assisting with JCAHO, ACR, MQSA, NRC, and state inspections.

- Teaching radiological physics and radiation biology to radiology residents. Instructions required about 100 hours of class room and laboratory instructions each year.
- Teaching paramedical personnel radiation safety in compliance with NRC and state regulations.

1976 – 2002 UPMC-McKeesport, McKeesport Pittsburgh PA

Director, Division of Radiation Physics

- All those services provided to Pittsburgh Mercy Health System were also provided to UPMC-McKeesport except for teaching radiology residents.

In the radiation oncology department, I provided physics services until 2001.

1970 – 1975 Boston City Hospital and BU Medial Center, Boston, MA

Assistant Professor of Radiology

- During five years association with both the Boston University Medical Center and the Boston City Hospital, held concurrent responsibilities as a Clinical Physicist, Researcher, and Teacher in the field of Radiological Physics.
- I was one of the early members to join the Center in which a Siemens 42 MV betatron was put in operation. As not much data were available for patient treatments, acquired all necessary data for dosimetry and computer treatment planning.
- Developed chemical dosimetry system.
- Participated in R.T.O.G. protocols.
- Taught radiation physics and radiation biology to radiation oncology residents.
- While at BU Medical Center, I held concurrent faculty position at North Eastern University where I taught Radiation Physics to radiology technologists.

1968 – 1970 Greater Baltimore Medical Center Baltimore MD

Physicist

- Treatment planning, calibration of radiation therapy equipment (AECL

Theratron-80 and G.E. Maxitron), leak testing and calibration of radium needles and Sr-90 eye applicator and radiation protection surveys of x-ray installations.

- Concurrently taught radiological physics to x-ray technologists.

1966 - 1970 **Johns Hopkins School of Hygiene and Public Health, Baltimore, MD**

Laboratory Assistant/Graduate Student

- In addition to completing requirement for the Doctoral Program at Johns Hopkins University, I taught radiological physics to residents and x-ray technologists at Johns Hopkins Medical Center.
- Wrote doctoral thesis on "MTF and PTF of Image Intensifiers".

Education

The Johns Hopkins University School of Hygiene and Public Health
Baltimore, MD
Doctor of Science degree in Radiological Sciences (1973)

Bombay University, Bombay, India
Masters of Science degree in Physics (1967)

Membership in Professional Societies

American Association Of Physicists In Medicine
American College Of Medical Physics
American College Of Radiology
Association Of Medical Physicists In India
Health Physics Society
Pennsylvania Radiological Society
Penn-Ohio Chapter of American Association of Physicists In Medicine
International Radiation Protection Association

Personal

Naturalized US citizen – Married – 2 children - Excellent Health

PUBLICATIONS, INVITED PAPERS AND PAPERS RESENTED AT SCIENTIFIC MEETINGS

Bhatnagar, J., Coletti, J., and Kalend, A.: Shielding Calculations for a Hybrid CT-PET scanner, (Submitted for publication in Health Physics) 2004.

Coletti, J., Bhatnagar, J., and Kalend, A.: Image quality and dosimetric evaluation of a new flat panel detector cardiac catheterization lab. Med. Phys. 31, 1775, 2004 (abs).

Bhatnagar, J., Kalend, A., and Coletti, J.: Shielding Calculations for a Hybrid CT-PET scanner, Med. Phys. 30, 1313, 2003. (Abstract)

Banerjee, K.D., Bhatnagar, J.P., Blackwood, Margaret, Scala, R.: Medical Physicist's Evaluation of Technologist Quality Control Program. Proceedings of the 20th Annual Pittsburgh Breast Imaging Seminar, 2000.

Banerjee, K.D., Bhatnagar, J.P., Blackwood, Margaret, Scala, R.: Medical Physicist's Evaluation of Technologist Quality Control Program. Proceedings of the 19th Annual Pittsburgh Breast Imaging Seminar, 1999.

Banerjee, K.D., Bhatnagar, J.P., Jarosz, M., Semon, M., Scala, R.: Medical Physicist's Evaluation of Technologist Quality Control Program. Proceedings of the 17th Annual Pittsburgh Breast Imaging Seminar, 1997.

Bhatnagar, J.P., Gorson, Robert O., and Krohmer, Jack S.: X-ray doses to patients undergoing full spinal radiographic examination. Radiology 138, 231, 1981.

Bhatnagar, J.P., Kaplan, Carl, and Specht, Robert: A rule of thumb for dose rate at point A for Fletcher-suit Applicator. Letter to Brit. J. Rad. 53, 511, 1980.

Bhatnagar, J.P.: Secondary radiation from supervoltage accelerators – its implications in patient protection. Letter to Editor, Brit. J. Rad. 50, 449, 1977.

Bhatnagar, J.P., and Feldman, M.I.: Single port technique of mantle field treatment in Hodgkin's Disease using very high energy x-ray beams. Radiology 123, 798, 1977.

Bhatnagar, J.P., and Kaplan, Carl: Multisweep modified moving strip technique for abdominal irradiation. Phys. Med. and Biol. 22, 547, 1977 (Abs.). ibid, presented at the Forth International Conference on Medical Physics, Ottawa, Canada, July, 1976.

Bhatnagar, J.P., Feldman, M.I., and Spira, J.: Biological effects evaluated as a function of patient thickness, beam quality, SSD, and treatment schedule. Cancer 35, 111, 1975. Ibid, presented at ASTRO meeting,

Florida, 1974.

Bhatnagar, J.P., and Spira, J.: Variation of percentage depth dose with beam area of 42 MV x-ray beam from betatron. Acta Radiol. 14, 28, 1975. ibid, presented at the XIII International Congress of Radiology, Madrid, Spain, 1973.

Bhatnagar, J.P., and Bates, L.M.: Spatial MTF of x-ray image intensifiers, Invited Paper, Proceedings of the SPIE symposium, Chicago, pp 155, 1973. ibid, AAPM meeting, San Diego, 1973. Phys. Med. Biol. 19, 240, 1974.

Bhatnagar, J.P., Rao, G.U.V., and Spira, J.: K-characteristic radiation exposure in x-ray beams generated at potentials up to 1 MV. Phys. Med. and Biol. 17, 447, 1972 (Abs.).

Bhatnagar, J.P., and Rao, G.U.V.: Kilovoltage calibration of diagnostic roentgen ray generators. Acta Radiol. 9, 555, 1970.

POSTER PRESENTATIONS AT PROFESSIONAL MEETINGS

Bhatnagar, J., Kalend, A., and Coletti, J.: Practical implementation of new US NRC regulations for Gamma Knife. Presented at the 46th Annual Meeting of AAPM. Med. Phys. 31, 1909, 2004.

Kalend, A., Bhatnagar, J., and Coletti, J.: An open ceiling radiosurgery vault for the practical source reloading of the Leksell Gamma Knife unit. Presented at the 46th Annual Meeting of AAPM. Med. Phys. 31, 1863, 2004.

Kalend, A., Watkins, S., Coletti, J., Bhatnagar, J., and Frich, J.: IMRT optimization by constraints conjugation in the Boolean transition region overlapping the PTV with NTV structures. Presented at the 2004 ASTRO annual meeting.

Kalend, A., Bhatnagar, J., and Coletti, J.: EPID's Exit Dosimetry: Defining its dose-pixel (DOXEL) Dispersion and validating IMRT portal doses in lung and Prostate, Med. Phys. 30, 1325, 2003.

Coletti, J., Bhatnagar, J., and Kalend, A.: Absolute and relative dose evaluation of the Leksell Gamma Knife using Kodak EDR2 and GAF chromatic films, Med. Phys. 30, 1305, 2003.

The American Board of Medical Physics

Hereby certifies that

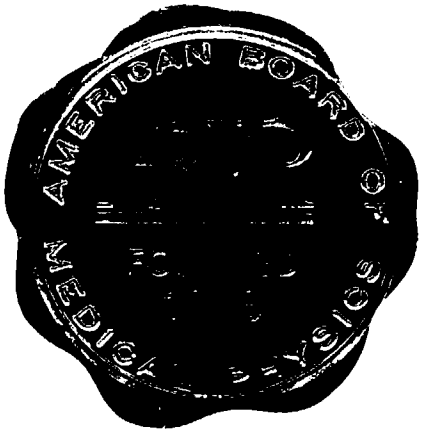
Jagdish P. Bhatnagar, Sc.D.

Has satisfactorily met the professional standards and clinical experience requirements in medical physics to qualify for

Certification in Medical Physics

with special competence in

Radiation Oncology Physics



October 16, 1989
DATE

CHAIRPERSON

Edward L. Nickoloff, D.Sc.
SECRETARY

NRC FORM 374

U.S. NUCLEAR REGULATORY COMMISSION

Amendment No. 01

MATERIALS LICENSE

Pursuant to the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974 (Public Law 93-438), and Title 10, Code of Federal Regulations, Chapter I, Parts 30, 31, 32, 33, 34, 35, 36, 39, 40, and 70, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, possess, and transfer byproduct, source, and special nuclear material designated below; to use such material for the purpose(s) and at the place(s) designated below; to deliver or transfer such material to persons authorized to receive it in accordance with the regulations of the applicable Part(s). This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954, as amended, and is subject to all applicable rules, regulations, and orders of the Nuclear Regulatory Commission now or hereafter in effect and to any conditions specified below.

Licensee	**In accordance with the letter dated August 29, 2002**
1. West Virginia University Hospital, Inc.	3. License No. 47-23066-03
	is amended in its entirety to read as follows:
2. One Medical Center Drive P.O. Box 9006 Morgantown, West Virginia 26506-9006	4. Expiration Date: August 31, 2012
	5. Docket No. 030-36074

6. Byproduct, source, and/or special nuclear material	7. Chemical and/or physical form	8. Maximum amount that licensee may possess at any one time under this license
A. Cobalt 60	A. Sealed sources (General Electric Company AB Elekta Model 43047)	A. 244.2 terabecquerels (TBq) (6,600 curies (Ci)) [201 sources with an average activity of 1.21 TBq (32.83 Ci) each and no single source to exceed 1.33 TBq (36 Ci)] See Item 9.A.

9. Authorized Use:

A. One set of 201 sources for **medical use permitted by 10 CFR 35.600**, in a Leksell Gamma Stereotactic Radiosurgery Device Model No. 24001 Type C (a.k.a. Gamma Knife or Cerebral Stereotactic Radiosurgical Unit). Also for demonstrations and training of personnel.

An additional set of 201 sources with a maximum activity of 244.2 TBq (6,600 Ci) may be possessed incident to source exchange.

CONDITIONS

10. Licensed material shall be used only at the licensee's facilities located at Room B816 of the Robert C. Byrd Health Sciences Center-South, One Medical Center Drive, Morgantown, West Virginia.

11. The Radiation Safety Officer for this license is Nasser Razmianfar, Ed.D.

MATERIALS LICENSE
SUPPLEMENTARY SHEET

License No.
47-23066-03

Docket or No.
030-36074

Amendment No.
01

12. **Licensed material is only authorized for use by, or under the supervision of:**

    A. Individuals permitted to work as an authorized user, and/or authorized medical physicist in accordance with 10 CFR 35.13 and 35.14.

    B. The following individuals are authorized users for medical uses:

	Material and Use
John D. Stageberg, M.D.	**Cobalt-60 for medical uses in a Gamma Stereotactic Radiosurgery Unit**
Scott Victor Watkins, M.D.	**Cobalt-60 for medical uses in a Gamma Stereotactic Radiosurgery Unit**
John C. Frich, M.D.	**Cobalt-60 for medical uses in a Gamma Stereotactic Radiosurgery Unit**

    C. The following individuals are authorized medical physicists:

	Material and Use
Andre Kalend, Ph.D.	**Cobalt-60 in a Gamma Stereotactic Radiosurgery Unit for calibrations, spot-checks, and training**
Jagdish Bhatnagar	**Cobalt-60 in a Gamma Stereotactic Radiosurgery Unit for calibrations, spot-checks, and training**
John G. Coletti, Ph.D.	**Cobalt-60 in a Gamma Stereotactic Radiosurgery Unit for calibrations, spot-checks, and training**

13. The licensee is exempted from decommissioning financial assurance requirements for possession of licensed material in sealed sources in quantities greater than the limits in 10 CFR 30.35(d) for the purpose of source exchanges only. This exemption is granted for no more than 30 days for any one source exchange.

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MATERIALS LICENSE **SUPPLEMENTARY SHEET**		License No. 47-23066-03
		Docket or No. 030-36074
		Amendment No. **01**

14. Except as specifically provided otherwise in this license and in 10 CFR 35.31, the licensee shall conduct its program in accordance with the statements, representations, and procedures contained in the documents, including any enclosures, listed below. The Nuclear Regulatory Commission's regulations shall govern unless the statements, representations and procedures in the licensee's application and correspondence are more restrictive than the regulations.

A. Application dated May 24, 2002, excluding QMP issues

B. Letters dated:

1) July 30, 2002 [clarifications and additional information, excluding QMP issues]
2) August 7, 2002 [do not include Drs. Coletti and Galloway at this time]
3) August 29, 2002 [add Dr. Coletti as an AMP]
4) November 12, 2002 [add Dr. Watkins as an AU]

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

NOV 2 2 2002

DATE _____

BY for David J. Collins

José M. Díaz Vélez, Health Physicist
Region II, Division of Nuclear Materials Safety
61 Forsyth Street, Suite 23T85
Atlanta, GA 30303-8931

N:\ACTIVE\47-23066-03 A01.wpd

This is to acknowledge the receipt of your letter/application dated

10/10/2005, and to inform you that the initial processing which includes an administrative review has been performed.

Amendment 37-00245-09

☒ There were no administrative omissions. Your application was assigned to a technical reviewer. Please note that the technical review may identify additional omissions or require additional information.

☐ Please provide to this office within 30 days of your receipt of this card

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A copy of your action has been forwarded to our License Fee & Accounts Receivable Branch, who will contact you separately if there is a fee issue involved.

Your action has been assigned **Mail Control Number** 137864.
When calling to inquire about this action, please refer to this control number.
You may call us on (610) 337-5398, or 337-5260.

NRC FORM 532 (RI)
(6-96)

Sincerely,
Licensing Assistance Team Leader