Boston University Medical Center

75 East Newton Street
Boston, Massachusetts 02118
617/247-5212

Radiation Protection Office

'85 MAR 25 A10:19 RECEIVED
U.S. N.R.C. FEE MGMT. BR.

March 11, 1985

License No. 20-02215-01
Docket No. 030-01845
Control No. 03195

RECEIVED BY LFMB
Date 3/25/85
Log MAR 12 I
By Brown
Orig. To
Action Compl.

U.S. Regulatory Commission
Region I
Attn: Laurence F. Friedman, Ph.D., C.H.P.
Senior Radiation Specialist
631 Park Avenue
King of Prussia, PA 19406

Gentlemen:

In response to your request of February 20, 1985, regarding the relationship between Boston University Medical Center and the institutions sending radioactive waste and the financial transactions involved, the following material is submitted:

1) Boston V.A. Medical Center Facility Mission Statement, July 1984, Section VI, which states in part "Both Boston University and Tufts University Schools of Medicine have a close affiliation with the Boston V.A. Medical Center".

2) Memorandum of Agreement (Affiliation) between Boston V.A. Medical Center and Boston University and Tufts Medical Schools . . . .; which states (Section 2,d) "will cooperate . . . . in the conduct of appropriate programs of education, training, and research".

3) The financial arrangements have been described in our letter of February 28, 1985 to the NRC License Fee Management Branch (Attn: Mr. Allen Cabell), as a "nominal charge by the Animal Science Center to cover expenses" which is customary for all B.U. Medical Center users of the service. For the period from 4/1/82 to 2/16/84 their records show an average charge of less than $20 per dog for 64 dogs, which represents a considerable saving compared with a charge of $300 per dog by a commercial waste disposal company. In our Radiation Protection Program review in October 1984 it was noted that the average total dose per dog was 25 microcuries of radionuclides in various combinations.

4) The conditions of a contract between the City of Boston and the Trustees of Boston University state that "a high quality post graduate training program, the pursuit of research, and the transmission of medical knowledge should contribute to good patient care".

ML10 FEE EXEMPT 03524

"OFFICIAL RECORD COPY" MAR 1 3 1985

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U.S. Regulatory Commission

There have been no specific formal agreements between the Boston University Medical Center and the institutions sending the waste, but if it is deemed advisable, such agreements could probably be obtained because of the expenses involved in alternative methods of disposal of waste from research activities in the institutions affiliated with the Boston University Medical Center.

Sincerely,

BELTON A. BURROWS, M.D.
Director, Radiation Protection

Encl. (2)

Boston University Medical Center

75 East Newton Street
Boston, Massachusetts 02118
617/247-5212

Radiation Protection Office

February 28, 1985

Ref. No. 20-02215-01

Nuclear Regulatory Commission
License Fee Management Branch
Washington, D.C. 20555

Attn: Mr. Allen S. Cabell

Dear Mr. Cabell:

With reference to your letter of February 8, 1985 regarding information as to how or in what capacity the Boston City Hospital and the Boston V.A. Medical Center are formally affiliated with the Boston University Medical Center, we enclose copies of a Memorandum of Agreement (Affiliation) between the Boston University School of Medicine, a constituent member, with the University Hospital, of the Boston University Medical Center, and the two Institutions for which we wish to provide the service of receiving radioactive waste at a nominal charge by the Animal Science Center to cover expenses. You may note that in paragraph 2 d of the memorandum the Boston V.A. Medical Center will cooperate with the Boston University School of Medicine in the conduct of appropriate programs of education, training and research.

Thank you for your attention to this matter.

Sincerely,

BELTON A. BURROWS, M.D.
Director, Radiation Protection

Encl. (2)
NRC Letter dated 2/8/85
VA Memorandum of Agreement dated 5/13/75
BCH Contract with BU dated July 1982

17pp.

A/497

FEB 14 1985

VETERANS ADMINISTRATION
DEPARTMENT OF MEDICINE AND SURGERY
WASHINGTON, D.C. 20420

MAY 13 1975

IN REPLY REFER TO: 144

Director (00/11)
VA Hospital
150 South Huntington Avenue
Boston, Massachusetts 02130

SUBJ: Memorandum of Agreement (Affiliation) between the Veterans Administration Hospital, Boston, Massachusetts, and The Boston University and Tufts University Schools of Medicine, Boston, Massachusetts (Our letter April 24, 1975)

1. We are pleased to advise you that the subject Memorandum of Agreement has been approved by the General Counsel and signed by the Chief Medical Director.

2. The signed agreement is enclosed for your file.

By direction of the Director, Field Operations, Region 1

RICHARD A. LEVINSON, M.D.
Director, Education Service
Academic Affairs

Enclosure

RECEIVED
OFFICE OF HOSPITAL DIRECTOR
VETERANS ADMIN. HOSPITAL
BOSTON, MASS.

MAY 15 1975

AM 7 8 9 10 11 12 1 2 3 4 5 6 PM

Show veteran's full name, VA file number, and social security number on all correspondence

Boston University Medical Center

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Boston, Massachusetts 02118
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Radiation Protection Office

February 28, 1985

Ref. No. 20-02215-01

Nuclear Regulatory Commission
License Fee Management Branch
Washington, D.C. 20555

Attn: Mr. Allen S. Cabell

Dear Mr. Cabell:

With reference to your letter of February [illegible], 1985 regarding information as to how or in what capacity the Boston City Hospital and the Boston V.A. Medical Center are formally affiliated with the Boston University Medical Center, we enclose copies of a Memorandum of Agreement (Affiliation) between the Boston University School of Medicine, a constituent member, with the University Hospital, of the Boston University Medical Center, and the two Institutions for which we wish to provide the service of receiving radioactive waste at a nominal charge by the Animal Science Center [illegible]. You may note that in paragraph 2.d of the memorandum the Boston V.A. Medical Center will cooperate with the Boston University School of Medicine in the conduct of appropriate programs of education, training and research.

Thank you for your attention to this matter.

Sincerely,

[illegible] A. Burrows, M.D.
Director, Radiation Protection

Encl. (2)
NRC Letter dated 2/8/85
VA Memorandum of Agreement dated 5/1/[illegible]

A/488

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3pp.

Center (BUMC) was actually initiated in December, 1979 following suspension of the delivery of such material to Hanford, Washington, and in view of the added cost of alternative methods of disposal (approx. $300 per dog). This institution (BVAMC) is an affiliated "deans committee" teaching hospital of Boston Univeristy School of Medicine (BUSM), an integral part of BUMC. The BUMC Broad Medical License authorized use of radionuclides in humans and animals for research. BVAMC is also affiliated with Tufts University Medical School (TUMS). The two medical schools share in the responsibilities for staffing, resident training, and medical school education in BVAMC.

Parallel programs are conducted in several disciplines and administrative programs in BVAMC and one or both of the medical schools. For example, there is a conjoint clinical clerkship for medical students from both schools on the Medical Service. The Chief, Nuclear Medicine Service, BVAMC, has until recently been Head, Nuclear Medicine Service, University Hospital (BU) and Chairman of the Radioisotope Committees at BVAMC and BUMC. In this dual role, he requested by letter of November 15, 1979, the services of the Animal Care Unit at BUMC to dispose of the radioactive dog carcasses, each containing approximately 30 microcuries in toto in dogs weighing approximately 60 pounds. This was approved by the BUMC Radioisotope Committee, as noted in their minutes of December 3, 1979.

The radionuclides in question were administered into the left heart chambers of the dogs in various quantities, singly, or more usually, in different combinations, in the form of microspheres to study coronary circulation under different experimental conditions. The hearts were subsequently removed and the tissues analyzed. The dogs were stored in a freezer for subsequent disposal. From five to seven percent of the injected microspheres were retained in the heart; the subsequent dosage data were corrected for this. The specifications for the integrity of the microspheres indicated that no excretion or secretion would occur. Due to the site of injection, the microspheres would be uniformly distributed throughout the circulatory system, rather than, for example, become trapped in the lungs or other body sites. The shipments of microspheres were received at four month intervals; the doses were adjusted to give a constant number of microspheres, not a constant radionuclide dose with correction for radioactive decay. Consequently, in ascending order of gamma ray energies, individual dogs in a sample of 64 dogs studied from 4/1/82 to 2/16/84, received from less than one to 28 microcuries of ^{141}Cerium, from less than one to 30 microcuries of ^{103}Ruthenium, from less than one to 22 microcuries of ^{95}Niobium, and from 2.5 to 24 microcuries of ^{46}Scandium. From these figures it might seem possible that individual dogs with minimum or maximum amounts of each radionuclide might receive from 5 to 104 microcuries in all, but actually the maximum amount in microcuries of various combinations was 60 at the time of the dose and the average 25. The dose variations of each radionuclide are indicated in the accompanying Table and Graph, indicating the fall-off in microcurie doses in the interval between each shipment. The dogs were than left in the freezer until four or five accumulated, with radioactive decay in storage during the period before transfer to BUMC. *With the hierarchy of gamma-ray energies from the radionuclides employed, the external radiation exposure per radionuclide per dog can be estimated from Guidelines to External Radiation Exposure (attached). Gamma radiation levels of the unshielded radionuclides would result in the following estimated exposures, expressed at mrem/hr/mCi at one foot, without correction for gamma-ray attenuation in body tissues: ^{141}Cerium - 0.35; ^{103}Ruthenium - 2.0; ^{95}Niobium - 4.5; and ^{46}Scandium - 10.9. The maximum exposures received from the individual radionuclides in the doses given at the time of injection, expressed as mr/hr, would be estimated as ^{141}Cerium 0.010; ^{103}Ruthenium 0.060; ^{95}Niobium 0.1; and ^{46}Scandium 0.26, for a total of 0.52 mr/hr with the maximum possible dose of all radionuclides. However, as has been indicated above, this combination was never used in the individual dogs in the study sample.

Boston University Medical Center

75 East Newton Street
Boston, Massachusetts 0211[illegible]
617 247 5212

Radiation Protection Office

February 28, 1985

Ref. No. 20-02715-01

Nuclear Regulatory Commission
License Fee Management Branch
Washington, D.C. 20555

Attn: Mr. Allen S. Cabell

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Thank you for your attention to this matter.

Sincerely,

[illegible] A. BURROWS, M.D.
Director, Radiation Protection

Encl. (2)
NRC Letter dated 2/8/85
VA Memorandum of Agreement dated 5/13/[illegible]

A/491

5pp.

~~9601180230~~

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60÷2.2=
27.27KG

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27,272g
30uCi/27,27[illegible]
=.0001uCi/g