NRC FORM 374 (7-94)

U.S. NUCLEAR REGULATORY COMMISSION

MATERIALS LICENSE

Amendment No. 95

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.

301978

Licensee	
1. University of Wisconsin-Madison Safety Department	In accordance with letter dated October 29, 1996
2. 30 North Murray Street Madison, WI 53715	3. License Number 48-09843-18 is amended in its entirety to read as follows:
	4. Expiration Date March 31, 1994
	5. Docket or Reference No. 030-03465/030-17753 070-00052/070-00134

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. Any byproduct material between Atomic Nos. 3 through 83, inclusive, except as noted below:	A. Any	A. 3 curies of each byproduct material, total possession limit 30 curies, except as noted below: Iodine-129 1 curie Sulfur-35 5 curies
B. Hydrogen-3	B. Any	B. 5000 curies
C. Carbon-14	C. Any	C. 5 curies
D. Phosphorus-32	D. Any	D. 5 curies
E. Cobalt-60	E. Any	E. 5 curies
F. Molybdenum-99/ Technetium-99m	F. Any	F. 10 curies
G. Cesium-137	G. Any	G. 20 curies
H. Americium-241	H. Any	H. 250 millicuries
I. Americium-241	I. Sealed sources	I. 5 curies
J. Curium-244	J. Any	J. 1 millicurie

050029

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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
K. Plutonium-239	K. Sealed Neutron sources	K. No single source to exceed 16 grams; total possession not to exceed 96 grams
L. Uranium-235	L. Fission chambers (LND Model Nos. 20991, 20992 and 3007N)	L. 10 grams total
M. Uranium (depleted in uranium-235)	M. Plated metal	M. 1,000 kilograms
N. Plutonium-239	N. Sealed sources	N. 10 sources not to exceed 5 microcuries each
O. Uranium-235	O. Any	O. 11.5 grams
P. Cesium-137	P. Sealed sources (3M Model Nos 4P6E, 4F6H, 4D6L, 4F6S, U.S. Nuclear Model No. 375, Isotope Products Lab. Model 193, Amersham Corp. capsules X.8 and X.9, Industrial Reactor Labs, Inc. Models 2-4 and 2-10, or J.L. Shepherd and Assoc. Model 6810)	P. 131.3 curies
Q. Any byproduct material identified in 10 CFR 35.100	Q. Any radiopharmaceutical identified in 10 CFR 35.100	Q. As needed

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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
R. Any byproduct material identified in 10 CFR 35.200	R. Any radiopharmaceutical identified in 10 CFR 35.200	R. As needed
S. Any byproduct material identified in 10 CFR 35.300	S. Any radiopharmaceutical identified in 10 CFR 35.300	S. As needed
T. Any byproduct material identified in 10 CFR 35.400	T. Any brachytherapy sources identified in 10 CFR 35.400	T. As needed
U. Any byproduct material identified in 10 CFR 35.500	U. Sealed sources identified in 10 CFR 35.500	U. As needed
V. Any byproduct material identified in 10 CFR 31.11	V. Prepackaged Kits	V. As needed
W. Iridium-192	W. Sealed sources (BYK Mallinckrodt Model CI L BV)	W. 2 sources not to exceed 12 curies each
X. Curium-244	X. Sealed sources (Isotope Product Labs. Model No. XAN-244-MG, XAN-244-AL, X-KIT-2 and XAN-244-NT)	X. No single source to exceed 4 millicuries, 65 millicuries total
Y. Americium-241	Y. Sealed source (Campbell Pacific Nuclear Model No. CPN-131)	Y. No single source to exceed 50 millicuries, 100 millicuries total

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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
Z. Uranium	Z. Uranium metal encapsulated in aluminum cans	Z. 2550 kilograms
AA. Cobalt-60	AA. Sealed Source (Neutron Products NPI 20-1200)	AA. 225 curies
BB. Uranium depleted in uranium-235	BB. Solid metal	BB. 22 kilograms
CC. Uranium-236	CC. Any	CC. 200 milligrams
DD. Any byproduct material listed in 10 CFR 30.71 Schedule B	DD. Any	DD. Not to exceed 10 CFR 30.71 Schedule B quantities.
EE. Polonium-210	EE. Plated foil source	EE. Not to exceed 30 millicuries per foil. Total possession not to exceed 100 millicuries
FF. Technetium-99m	FF. Any	FF. As needed
GG. Iodine-131	GG. Any	GG. As needed

9. Authorized Use:

A. through J. To be used for medical research and research and development as defined in 10 CFR Part 30, Section 30.4 including animal studies and student instruction.

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K. To be used for training students, instrument calibration, and in conjunction with a subcritical assembly, or for other laboratory experiments requiring neutrons.

L. To be used as neutron flux monitors in a deuterium/tritium generator.

M. To be used for shielding in linear accelerators and electron microscopes.

N. To be used for instrument standardization and calibration.

O. and CC. To be used for mass spectroscopy of geologic samples, laboratory analysis of irradiated samples, and/or measurement of neutron flux.

P. To be used in a J.L. Shepherd & Assoc. Model 78-2M irradiator for calibration of instruments and irradiation of materials excluding highly flammable or explosive materials.

Q. Medical use described in 10 CFR 35.100.

R. Medical use described in 10 CFR 35.200.

S. Medical use described in 10 CFR 35.300.

T. Medical use described in 10 CFR 35.400.

U. Medical use described in 10 CFR 35.500 in devices which have been evaluated and approved for licensing purposes by the U.S. Nuclear Regulatory Commission or an Agreement State.

V. In vitro studies.

W. One source to be used in accordance with Condition No. 32 in a Nucletron Corporation Micro Selectron-HDR remote afterloading brachytherapy device for interstitial, intraluminal and intracavitary radiotherapy, and surface radiotherapy applications as described in letter dated May 10, 1993, and for irradiation of materials, dosimeters, and animals. One source in its shipping container to be in possession of the licensee as necessary for replacement of the source in the irradiation device.

X. To be used for calibration of instruments and for possession incident to transfer of the sources to individuals specifically licensed by the NRC or an Agreement State.

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Y. To be used in Campbell Pacific Nuclear Model No. 503 Hydroprobe surface moisture/density gauge.

Z. To be used in a subcritical assembly for student instruction.

AA. To be used in a Picker Model C-9000 teletherapy unit for irradiation of animals, cell cultures or materials, excluding flammable or explosive materials and for radiation detection instrument calibration.

BB. Shielding in a Picker Model C-9000 teletherapy unit.

DD. To be used for in vitro studies of lake algae, bacterial metabolism, and trace metal uptake.

EE. To be used in electrospray ionization mass spectrometry for DNA sequencing.

FF. For veterinary diagnostic studies as described in letters dated October 29 and December 19, 1996.

GG. For veterinary therapy treatments of hyperthyroidism in felines as described in letters dated October 29 and December 19, 1996.

CONDITIONS

10. A. Licensed material shall be used only at the licensee's facilities located at the campus of the University of Wisconsin-Madison, Madison, Wisconsin, 7E of Meriter Hospital, Inc., 202 S. Park St., Madison, Wisconsin, and 6001 Research Park Blvd., Madison, Wisconsin.

B. The licensee is authorized to possess and use up to 10 microcuries of cobalt-60 and 1 millicuries of iron-55 as sealed sources at the Marshall Space Flight Center, Huntsville, Alabama, Kennedy Space Center, Florida, and the Cape Kennedy Air Force Station, except for the Lighthouse area, the South Cape (areas north of the old north boundary which runs between Complex 34 and 37) as described in letters dated June 1, 1972 and June 21, 1972, and application dated August 19, 1974.

C. Iodine-125 and americium-241 may be used at temporary locations anywhere in the United States where the U.S. Nuclear Regulatory Commission maintains jurisdiction for regulating the use of licensed material.

D. The licensee is authorized to possess and use 100 millicuries of hydrogen-3, 50 millicuries of carbon-14, 25 millicuries of phosphorus-32 and 10 millicuries of sulfur-35 at the Laboratory of Thermal Biology, West Yellowstone, Montana in accordance with application dated August 19, 1974.

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E. In accordance with letter dated August 19, 1972, and application dated August 19, 1974, the licensee is authorized to possess and use (a) one millicurie each of hydrogen-3, carbon-14, phosphorus-32 and sulfur-35 at Lakes Mendota, Monona, Waubese, and Kagonse in Dane County, Wisconsin, Yellowstone National Park, Wyoming and Lake Geneva, Lake Pine, Lake Wingra, Lake Devils, and Badfish Creek Stream, and (b) 100 millicuries of hydrogen-3, 50 millicuries of carbon-14, 25 millicuries of phosphorus-32 and 10 millicuries of sulfur-35 at the Laboratory of Thermal Biology, West Yellowstone, Montana.

F. Licensed material may also be used at the University of Wisconsin, Physical Science Laboratory, Staughton, Wisconsin and the Wisconsin Geological and Natural History Survey, 3817 Mineral Point Road, Madison, Wisconsin.

G. Patients administered cesium-137 and iridium-192 implants may be hospitalized at the Veterans Administration Hospital, Madison, Wisconsin.

H. Sealed sources in moisture meters and soil density meters may be used at temporary job sites of the licensee anywhere in the State of Wisconsin.

I. The licensee is authorized to possess and use the following radionuclides at the University of Wisconsin's Trout Lake Biological Station, Vilas County, Wisconsin:

Phosphorus-32	50 millicuries
Carbon-14	25 millicuries
Nickel-63	25 millicuries
Cadmium-109	25 millicuries
Zinc-65	25 millicuries
Phosphorus-33	25 millicuries
Hydrogen-3	75 millicuries
Sulfur-35	25 millicuries
Mercury-203	25 millicuries

J. The licensee is authorized to possess and use a maximum of 1 millicurie of hydrogen-3 at 9569 Walkinson Road, Mazomanie, Wisconsin and 1 millicurie of carbon-14 at the Arlington experimental Station, Madison, Wisconsin in accordance with letters dated April 30, 1985 and April 12, 1996.

K. The licensee is authorized to possess and use a maximum of 240 microcuries of hydrogen-3 at the Potter Preserve, Baraboo Hills, Wisconsin in accordance with statements and procedures contained in letter dated November 11, 1985.

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L. The licensee is authorized to possess and use a maximum of 5 millicuries of hydrogen-3 at Leopold Memorial Reserve, Sauk County, Wisconsin in accordance with the statements and procedures contained in letter dated May 2, 1986.

M. The licensee is authorized to possess and use a maximum of 6 millicuries of hydrogen-3 at the property located in 9344 Box Turtle Road, Mazomanie Township, Wisconsin in accordance with statements and procedures contained in letter dated May 2, 1986.

N. The licensee is authorized to possess and use a maximum of 200 microcuries of carbon-14 and 50 microcuries of hydrogen-3 at Charmany Farm, University of Wisconsin-Madison, Madison, Wisconsin in accordance with statements and procedures contained in letter dated May 2, 1986.

O. The licensee is authorized to possess and use a maximum of 6 millicuries of carbon-14 and 20 millicuries of hydrogen-3 at the Aquaculture Research Laboratory, 302 South Main Street, Lake Mills, Wisconsin in accordance with statements and procedures contained in letter dated November 24, 1986 (with attachments).

P. The licensee is authorized to possess a maximum of 5 millicuries of hydrogen-3 at the Sauk County, Leopold Memorial Reserve in accordance with statements and procedures contained in letter dated February 29, 1988 (with attachments).

Q. The licensee is authorized to possess and use a maximum of 2 millicuries of carbon-14 at the A.E. Anding Estate, the intersection of River and Helena Roads, Iowa County, Wisconsin, in accordance with statements and procedures contained in letter dated January 24, 1990.

R. Licensed material listed in Subitem Z. (subcritical assembly) shall be used at the licensee's facilities located at the Mechanical Engineering Bldg. on the campus of the University of Wisconsin - Madison, Madison, Wisconsin.

S. The licensee is authorized to possess and use the following radionuclides at Marl Lake located in Hartman Creek State Park in Waupaca County and at Sparkling Lake located next to Hwy. 51 in Vilas County in accordance with letter dated April 21, 1993:

Carbon-14	200 microcuries
Hydrogen-3	200 microcuries
Cadmium-109	2 microcuries
Mercury-203	2 microcuries
Zinc-65	2 microcuries

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T. The licensee may store waste at the Mills Street Storage facility and at the 2120 Herrick Drive storage facility as described in letter dated November 8, 1993.

U. The licensee may use the snow water content device containing up to 5 millicuries of europium-152/154 at temporary job sites of the licensee anywhere in the State of Wisconsin.

V. Licensed material listed in Subitem D.D. may be used at temporary joy sites of the licensee anywhere in the State of Wisconsin in accordance with letters dated April 21, 1993 and November 8, 1993.

11. A. Of those radionuclides listed in the schedule of the document "Licensed Possession Limits for Which Licensee Radiological Contingency Plans are Required," which was Enclosure 2 of the Order signed February 11, 1981, the quantities present in any one building shall not exceed the quantities specified in the conditions and schedules of that document.

B. This condition does not supersede any of the specifications shown in Items 6., 7., 8. and 9. of the license.

12. A. Licensed material for non-human use shall be used by, or under the supervision of individuals designated by the University Radiation Safety Committee, Bruce Thomadsen, Chairman.

B. Licensed material for human use shall be used by or under the supervision of individuals designated by the Medical Center Radiation Safety Committee, Michael Wilson, M.D., Chairman.

C. The use of licensed material in or on humans shall be by a physician, dentist, or podiatrist as defined in 10 CFR 35.2.

D. Physicians, dentists, or podiatrists designated to use licensed material in or on humans shall meet the training criteria established in 10 CFR 35, Subpart J and shall be designated by the licensee's Radiation Safety Committee. The licensee shall maintain records of individuals designated as users for three years after the individual's last use of licensed material.

E. The Radiation Safety Officer for this license is Ronald Bresell.

F. The Alternate Radiation Safety Officer for this license is Abdul BenZikri.

13. A. Sealed sources and detector cells shall be tested for leakage and/or contamination at intervals not to exceed 6 months or at such other intervals as specified by the certificate of registration referred to in 10 CFR 32.210.

B. Notwithstanding Paragraph A of this Condition, sealed sources designed to emit alpha particles shall be tested for leakage and/or contamination at intervals not to exceed 3 months.

C. In the absence of a certificate from a transferor indicating that a leak test has been made within 6 months prior to the transfer, a sealed source or detector cell received from another person shall not be put into use until tested.

D. Each sealed source fabricated by the licensee shall be inspected and tested for construction defects, leakage, and contamination prior to any use or transfer as a sealed source.

E. Sealed sources need not be leak tested if:

(i) they contain only hydrogen-3; or

(ii) they contain only a radioactive gas; or

(iii) the half-life of the isotope is 30 days or less; or

(iv) they contain not more than 100 microcuries of beta and/or gamma emitting material or not more than 10 microcuries of alpha emitting material; or

(v) they are not designed to emit alpha particles, are in storage, and are not being used. However, when they are removed from storage for use or transferred to another person, and have not been tested within the required leak test interval, they shall be tested before use or transfer. No sealed source or detector cell shall be stored for a period of more than 10 years without being tested for leakage and/or contamination.

F. The leak test shall be capable of detecting the presence of 0.005 microcurie of radioactive material on the test sample. Records of leak test results shall be kept in units of microcuries and shall be maintained for inspection by the Commission. If the test reveals the presence of 0.005 microcurie or more of removable contamination, a report shall be filed with the U.S. Nuclear Regulatory Commission and the source shall be removed immediately from service and decontaminated, repaired, or disposed of in accordance with Commission regulations. The report shall be filed within 5 days of the date the leak test result is known with the U.S. Nuclear Regulatory Commission, Region III, 801 Warrenville Road, Lisle, IL 60532-4351, ATTN: Chief, Nuclear Materials Safety Branch. The report shall specify the source involved, the test results, and corrective action taken. Records of leak test results shall be kept in units of microcuries and shall be maintained for inspection by the Commission. Records may be disposed of following Commission inspection.

14. In lieu of using the conventional radiation caution colors (magenta or purple on yellow background) as provided in Section 20.203(a)(1), of 10 CFR Part 20, the licensee is hereby authorized to label detector cells and cell baths, containing licensed material and used in gas chromatography devices, with conspicuously etched or stamped radiation caution symbols without a color requirement.

15. Detector cells containing licensed material shall not be opened or the sources removed from the detector cell by the licensee.

16. Sealed sources containing licensed material shall not be opened.

17. The licensee shall not perform repairs or alterations of the irradiator involving removal of shielding or access to the licensed material. Removal, replacement, and disposal of sealed sources in the irradiator shall be performed by a person specifically licensed by the Commission or an Agreement State to perform such services.

18. The licensee shall limit in-house repair and maintenance by University of Wisconsin personnel, on J. L. Shepherd irradiators, to those individuals who have successfully completed the J. L. Shepherd five day repair\maintenance course. Further, repairs and maintenance shall be limited to those activities and procedures covered by the manuals provided with the training course.

19. The licensee is authorized to transport licensed material only in accordance with the provisions of 10 CFR Part 71, "Packaging and Transportation of Radioactive Material."

20. The licensee is authorized to hold radioactive material with a physical half-life of less than 120 days for decay-in-storage before disposal in ordinary trash provided:

A. Radioactive waste to be disposed of in this manner shall be held for decay a minimum of 10 half-lives.

B. Before disposal as ordinary trash, byproduct material shall be surveyed at the container surface with the appropriate meter set on its most sensitive scale and with no interposed shielding to determine that its radioactivity cannot be distinguished from background. All radiation labels shall be removed or obliterated.

C. Generator columns shall be segregated so that they may be monitored separately to ensure decay to background levels prior to disposal.

D. A record of each disposal permitted under this License Condition shall be retained for 3 years. The record must include the date of disposal, the date on which the byproduct material was placed in storage, the radionuclides disposed, the survey instrument used, the background dose rate, the dose rate measured at the surface of each waste container, and the name of the individual who performed the disposal.

21. Pursuant to Sections 20.106(b) and 20.302 of 10 CFR Part 20, the licensee is authorized to dispose of byproduct material by incineration provided the gaseous effluent from incineration does not exceed the limits specified for air in Appendix B, Table II, 10 CFR Part 20. Ash residues may be disposed of as ordinary waste provided appropriate surveys pursuant to Section 20.201 of 10 CFR Part 20 are made to determine that concentrations of licensed material appearing in the ash residues do not exceed the concentrations (in terms of microcuries per gram) specified for water in Appendix B, Table II, 10 CFR Part 20.

22. Experimental animals, or the products from experimental animals, that have been administered licensed materials shall not be used for human consumption.

23. Licensed material shall not be used in or on human beings or in field applications where activity is released except as provided otherwise by specific condition of this license.

24. A. Access to the room housing the MicroSelectron-HDR irradiation device shall be controlled by a door at each entrance.

B. The entrance to the irradiation room shall be equipped with an electrical interlock system that will cause the source to return to the shielded position immediately upon opening of the entrance door. The interlock system shall be connected in such a manner that the source cannot be placed in the irradiation position until the entrance door is closed at the source on-off control is reset at the control panel.

C. Electrical interlocks on the entrance door to the irradiator room shall be tested for proper operation at least once a month. Records of test results shall be maintained for inspection by the Commission.

D. In the event of malfunction of the door interlock, the irradiation device shall be locked in the "off" condition and not used, except as may be necessary for repair or replacement of the interlock system, until the interlock system is shown to be functioning properly.

Prior to initiation of a treatment program, and subsequent to each source exchange for the MicroSelectron-HDR, radiation surveys and tests shall be performed in accordance with the following:

25. A. A radiation survey shall be made of:

(1) The source housing, with the source in the shielded position. The maximum radiation levels at 100 centimeters from the surface of the source head shall not exceed 0.25 milliroentgens per hour.

(2) All areas adjacent to the treatment room with the source in the "irradiation" position. The survey shall clearly establish:

(a) That radiation levels in restricted areas are not likely to cause personnel exposure in excess of the limits specified in Section 20.101, Title 10, Part 20, code of Federal Regulations, Chapter 1, "Standard for Protection Against Radiation" (10 CFR 20).

(b) That quantities of radiation in unrestricted areas do not exceed the limits specified in Section 20.105(b) 10 CFR 20.

B. Records of survey results shall be maintained for inspection by the Commission.

26. The following shall be performed only by persons specifically authorized by the Commission or an Agreement State to perform such services:

    A. Installation and replacement of sources contained in the MicroSelectron-HDR irradiation device.

    B. Any maintenance or repair operations on the irradiator involving work on the source head, the source driving unit, or other mechanism that could expose the source, reduce the shielding around the source, or compromise the safety of the unit and result in increased radiation levels.

27. The licensee shall install in the afterloader room a permanent radiation monitor capable of continuously monitoring source status.

    A. A radiation monitor must provide visible notice of an afterloader unit malfunction that results in an exposed or partially exposed source, and must be observable by an individual entering the afterloader room.

    B. The radiation monitor must be equipped with a backup power supply separate from the power supply to the afterloader unit. This backup power supply may be a battery system.

    C. The radiation monitor must be checked with a dedicated check source for proper operation each day before the afterloader unit is used for treatment of patients.

    D. A licensee shall maintain a record of the check required by paragraph C. for three years. The record must include the date of the check, notation that the monitor indicates when its detector is and is not exposed, and the initials of the individual who performed the check.

    E. If a radiation monitor is inoperable, the licensee shall require any individual entering the afterloader room to use a survey instrument or audible alarm personal dosimeter to monitor for any malfunction of the source exposure mechanism that may result in an exposed or partially exposed source. The instrument or dosimeter must be checked with a dedicated check source for proper operation at the beginning of each day of use. The licensee shall keep a record as described in paragraph D. of this section.

    F. A licensee shall promptly repair or replace the radiation monitor if it is inoperable.

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28. The licensee shall maintain records of information related to decommissioning at the location listed in Item 2. of the license per the provisions of 10 CFR 30.35(g) until this license is terminated by the Commission.

29. A. Access to the teletherapy room shall be controlled by a door at each entrance. Such doors shall be normally closed.

B. Each entrance to the teletherapy room shall be equipped with an electrical interlock system that will turn the teletherapy machine's primary beam of radiation "off" immediately upon opening of any entrance door. The interlock system shall be connected in such a manner that the teletherapy machine's primary beam of radiation cannot be turned "on" until all treatment room entrance doors are closed and the beam "on-off" control is reset at the control panel.

C. Electrical interlocks on entrance doors to the teletherapy room shall be tested for proper operation at least once every 6 months. Records of test results shall be maintained for inspection by the Commission. Records may be disposed of following Commission inspection.

D. In the event of malfunction of any door interlock, the teletherapy machine control shall be locked in the "off" condition and not used, except as may be necessary for repair or replacement of the interlock system, until the interlock system is shown to be functioning properly.

30. The following shall be performed only by persons specifically licensed by the Commission or an Agreement State to perform such services:

A. Installation, relocation, or removal of teletherapy units containing sources.

B. Source exchange.

C. Any maintenance or repair operations on a teletherapy unit involving work on the source drawer, the shutter, or other mechanism that could expose the source, reduce the shielding around the source, or compromise the safety of the unit and result in increased radiation levels.

31. For purposes of Condition 29., access door #1, located at the control room, at the top of the ramp, is not considered an entrance to the teletherapy room and is, therefore, not required to be equipped with an electrical interlock.

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32. The licensee is authorized to remove the Picker Model C-9000 teletherapy unit off its track for storage and for purposes of obtaining access to the neutron generator beam line in accordance with the procedures outlined in letters dated August 27, 1992 and November 17, 1992.

33. The licensee may possess 24 curies of iridium-192 (not to exceed 12 curies per source) for use in the Nucletron Corporation MicroSelectron HDR remote afterloading brachytherapy device, provided the individual source activity does not exceed 10 curies at the time of installation, and the source is installed by an authorized individual.

34. Except as specifically provided otherwise in this license, the licensee shall conduct its program in accordance with the statements, representations, and procedures contained in the documents, including any enclosures, listed below. The U.S. 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. Applications dated July 7, 1980, February 20, 1986, January 10, 1989 and November 2, 1979 (excluding frequency and scope of interlock system tests); and

B. Letters dated December 19, 1980, July 25, 1983, August 5, 1983, March 21, 1984, November 19, 1984, July 25, 1985, March 12, 1986, July 17, 1986, May 1, 1987, June 7, 1988 (with enclosures), July 26, 1989, January 24 1990, April 6, 1990 (with attachments), April 16, 1990 (with attachments), June 20, 1990 (with attachments), August 8, 1990, December 27, 1990, November 14, 1991, September 21, 1992, March 1, 1993, March 15, 1993 (except Item 8.), March 4, 1980, January 12, 1981, March 9, 1982, February 19, 1985, November 14, 1991, March 15, 1992 (excluding Item 3, regarding off track storage of teletherapy unit), August 27, 1992, September 21, 1992, November 17, 1992, April 21, 1993, May 10, 1993 (except Items 1 and 2), June 16, 1993, June 26, 1993 pertaining to the Picker Model C-9000 teletherapy unit exclusively August 9, 1993 pertaining to the Picker Model C-9000 teletherapy unit exclusively, July 26, 1993, August 12, 1993, November 8, 1993, and January 21, 1994, March 8, 1994, August 8, 1994, November 18, 1994, December 2, 1994, July 21, 1995, October 24, 1995, May 16, 1996 (with enclosures), and April 12, 1996 (except Item 3), October 29, 1996 and December 19, 1996.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Date 1/16/97

By Kevin D. Null
Materials Licensing Branch, Region III

BETWEEN:

License Fee Management Branch, ARM
and
Regional Licensing Sections

(FOR LFMS USE)
INFORMATION FROM LTS

Program Code: 02110
Status Code: 2
Fee Category: 7B EX 2C 2b 1D 3P 3E
Exp. Date: 19940331
Fee Comments: 170.11(A)(4)
Decom Fin Assur Reqd: Y

R2

LICENSE FEE TRANSMITTAL

A. REGION

1. APPLICATION ATTACHED
   Applicant/Licensee: WISCONSIN-MADISON, UNIVERSITY OF
   Received Date: 961021
   Docket No: 3003465
   Control No.: 301978
   License No.: 48-09843-18
   Action Type: Amendment

2. FEE ATTACHED
   Amount: 0
   Check No.: 0

3. COMMENTS

Signed D. Hersey
Date 11-29-96

B. LICENSE FEE MANAGEMENT BRANCH (Check when milestone 03 is entered /)

1. Fee Category and Amount: 7B EX 2C 2b 1D 3P 3E

FEE TRANSMITTAL

2. Correct Fee Paid. Application may be processed for:
   Amendment ✓
   Renewal
   License

3. OTHER

Signed SC
Date 11/18/96

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UNIVERSITY OF
WISCONSIN
MADISON

October 15, 1996

U.S. Nuclear Regulatory Commission, Region III
Nuclear Materials Licensing Section
801 Warrenville Road
Lisle, Illinois 60532-4351

RE: Veterinary Nuclear Medicine Program - BML No. **48-09843-18**

The University of Wisconsin, Madison (UW) School of Veterinary Medicine (SVM) has decided to expand their curriculum by entering into the field of veterinary nuclear medicine. The primary reason for this expansion is to insure matriculating veterinary students receive training in all current treatment modalities within the field of veterinary care.

While this endeavor is entirely within the scope of para 9.A. of the UW's byproduct material license which authorizes use "*... for medical research and research and development as defined in 10 CFR Part 30, Section 30.4 including animal studies and student instruction,*" the attachment to this letter will serve to describe the program as implemented.

If you have any questions pertaining to this request, please call me at (608) 262-9178 or FAX me at (608) 262-6767.

Sincerely,

Ronald R. Bresell

Ronald R. Bresell
Radiation Safety Officer

170.11(A)(4)
FEE EXEMPT
Pm: 10-16-96

RECEIVED
OCT 21 1996
REGION III

OCT 21 1996

Safety Department

University of Wisconsin–Madison 30 North Murray Street Madison, Wisconsin 53715-2609
608/262-8769 FAX: 608/262-6767

30/978

Veterinary Nuclear Medicine

1. Attached as Appendix A are the CVs for the physicians who will initially implement this program.

   a. Dr. Forrest, a Clinical Assistant Professor of Radiology is also the principal user of the SVM Theratron 78 teletherapy unit and board certified by the American College of Veterinary Radiology in Radiation Oncology.

   b. Dr. Trostle, a Clinical Assistant Professor of Surgery specializes in large animal veterinary medicine.

   Both physicians have had extensive experience in veterinary nuclear medicine before their appointments at the UW. Additionally, Dr. Forrest and Radiation Safety personnel went to the University of Illinois at Urbana-Champaign BML 12-00330-05 (terminated), to discuss pertinent aspects of a viable, long running veterinary nuclear medicine program.

   All workers involved in this program will be trained and monitored as radiation workers as defined in our broad scope license.

2. Veterinary nuclear medicine uses radiopharmaceuticals in ways similar to clinical human nuclear medicine (10 CFR Part 35), the major difference is the administered activity since the patients range in mass from 5 kg to 500 kg. Attached as Appendix B are the protocols.

   The SVM intends to procure unit doses of radiopharmaceuticals either from the UW's Nuclear Medicine Clinic or from an independent radiopharmacy. Syringe shields will be used when applicable and practical. The doses will be administered under the direct supervision of a principle investigator trained in such administration.

   Workload is anticipated to be moderate. Initially the clinic expects to see 2 - 3 patients per week and could ultimately operate a clinic with a caseload of 7 - 12 animals per week.

3. Because these patients are animals, control of potential contamination must be considered. Additionally, the magnitude of the radioactivities involved may warrant exposure concern.

   Conceptually, following administration of radioactive material, patients will be housed in designated area that can contain and/or facilitate disposal of contaminated material and has the appropriate radiation area notifications and controlled access. Each small animal will be tagged with a bright collar bearing the radiation warning

symbol and appropriate warnings. Large animals will have a similar warning tag affixed to their halter. Additionally, the patient's record will be labelled to indicate the patient has received radioactive material and to whom to direct questions.

The maximum exposure rate at 1 meter from the approximate center of the target organ(s) shall be determined immediately after administration of the radiopharmaceutical and shall be entered on the patients chart. When redistribution or significant excretion of the radionuclide is anticipated, the exposure rate shall be remeasured and recorded at appropriate intervals. Exposure rate will be the basis for determination of the length of time which an attendant clinician or student may spend near the patient. Clients/owners will not be allowed to visit patients during the period of confinement.

Contaminated excreta will be processed by half-life decay and final disposal as animal excreta. Certain concerns for specific animal species:

a. Horses - Currently we envision horses to be the only large animal we will treat. Horses will be housed in the large animal holding area. The preferable stall will be the one nearest the imaging area; however, all stalls are similar and the controls implemented will be similar.
   (1) Extra heavy (wood shaving) bedding will be utilized to completely absorb urine. The sex of the horse will determine the possible locations for urination; males in the center of the stall, females around the perimeter. Drains are not located inside the stall, hence the absorption of urine can occur within the stall with no leakage to the environment.
   (2) Until data is collected, dose measurements will be made to determine whether a radiation area exists outside the stall itself. We do not believe this likely since a dose of 150 mCi ^{99m}Tc dose is calculated (Γ = 0.7 R/mCi-hr @ 1 cm; D = 0.07 mR/mCi-hr @ 1 m) to deliver a maximum of 2.6 mR/hr @ 6 feet. Thus, routinely the stall will be well labeled (**Caution - Radioactive Materials**) on all assessable areas. If the stall abuts an outside wall, initially we will measure the exposure rate outside.
   (3) After the patient is released, the stall will be tagged as contaminated along with the date after which the bedding can be handled as non-contaminated by animal care workers.

b. Dogs - Canines are housed in cages which share a common drain at the rear corner of the dog run. We will block access to this drain from the cage housing the dog injected with the radiopharmaceutical.
   (1) Some animals refuse to urinate inside. In these instances, trained animal care workers will accompany the animal to a specially designated and marked (grass/dirt) fenced-in area outside where they may

purge their bladder.

(2) Animals will be tagged as radioactive and only specifically trained individuals will be allowed to assist in the animal's care.

(3) After the patient is released, the cage will be tagged as contaminated along with the date after which it can be hosed down by animal care workers.

c. Cats - Because of their nature, felines are the easiest animal to care for.

(1) Cat litter will be handled as radioactive waste.

(2) Cats will be carried to and from imaging rooms in animal carriers or upon carts.

(2) After the patient is released, the cage will be tagged as contaminated along with the date after which it can be hosed down by animal care workers.

d. Iodinations - Older cats have a relatively high risk for feline hyperthyroidism which responds to a therapeutic (2 - 8 mCi) ^{131}I dose. Considerations in this therapy include:

(1) Only specially trained personnel may be involved.

(2) The cage will be labeled (**Caution - Radioactive Materials**) and the cat will wear a yellow/magenta tape collar and will be housed in relative isolation. The floor in front of the cage will be covered in absorbent paper.

(3) The cat will be monitored daily and the results of this monitoring will be used to determine release.

(4) During the past five years, the UW has performed several feline iodinations. The room in which the animal cage will be housed has good ventilation negating the need for air monitoring. Initially, workers involved in treating and caring for these felines will routinely receive thyroid bioassays. The results of this monitoring may suggest a more routine bioassay program.

When transporting the animal to the imaging area, the shortest route will be taken. Trained animal care workers will survey the route from the area the animal is housed to the imaging area to insure any contamination which occurs will be within defined limits or decontaminated. Decontamination supplies will be available and personnel utilized will be informed of the location of these supplies and decontamination procedures.

4. Radioactive waste will be disposed of according to conditions of the UW's NRC broad scope license.

a. Because of the short half-lives of the radionuclides, the primary mechanism to be employed will be decay-in-storage. As noted above, absorbent material in

the large animal stalls will be allowed to decay a minimum of 10-half-lives and will be monitored (per Reg Guide 10.8) prior to disposal as not radioactive waste.

b. In the event of patient death before release, the body will be handled and disposed under conditions of the UW's license.

5. Release of patients to owners or other clinical wards will follow exposure guidelines found in NUREG-1492, *Regulatory Analysis on Criteria for the Release of Patients Administered Radioactive Material* and DG-8015, *Release of Patients Administered Radioactive Materials* to insure doses to members of the general public are maintained below 100 mrem. Patients may be released when **all** the following criteria have been met.

a. The total integrated dose that could be accumulated by any individual in close association (1 meter) with the patient for an infinite period of time (D_∞) is less than 100 mrem. This dose can be calculated (equation (7), NUREG-1492):

$$\frac{mR}{hr} = \frac{100\,mR}{1.44 \times T_{eff}}$$

If the effective half-life is unknown (or as a worst case example), then the physical half-life may be used. For our purposes, examples of allowable exposure rates at the time of release for some of the common diagnostic and therapeutic radioisotopes are in the table:

Nuclide	$T_{½}$	Γ/10 (mR/mCi-hr)	mR/hr @ 1 m
^{67}Ga	3.25 day	0.11	0.9
^{99m}Tc	0.25 day	0.07	11.6
^{111}In	2.81 day	0.48	1.0
^{113m}In	0.07 day	0.23	40.4
^{123}I	0.55 day	0.07	5.22
^{131}I	8.04 day	0.22	0.36
^{201}Tl	3.8 day	0.09	0.94

b. A minimum confinement period based on the half-life of the administered radioisotope has been satisfied. These minimum periods will be sufficient to allow at least one half-life period to occur before release and allow for excretion of radioactive urine and feces for those radiopharmaceuticals with a significant rate of excretion. The confinement period for most radioisotopes

shall be:

Half-life	Min Confinement Period
< 12 hr	1 physical half-life
12 - 24 hr	24 hr
> 24 hr	48 hr

c. The owner or agent of the patient shall be provided a detailed written document explaining the hazards and precautions relative to their stewardship of the patient during the period of potential exposure and environmental contamination (10 half-lives). A sample of such documentation is included as Appendix C.

CURRICULUM VITAE

June, 1996

Lisa Jo Forrest

Current Position: Clinical Assistant Professor - Radiology

Office Address: University of Wisconsin - Madison
School of Veterinary Medicine
2015 Linden Drive, West
Madison, WI 53706
(608) 263-5668

BOARD CERTIFICATION

Diplomate, American College of Veterinary Radiology 12/93
Diplomate, American College of Veterinary Radiology (Radiation Oncology) 8/95

PROFESSIONAL EXPERIENCE

University of Wisconsin - Madison
School of Veterinary Medicine
Department of Surgical Sciences
2015 Linden Drive West
Madison, WI 53706
(608) 263-9808
7/1/94 - present

Clinical Assistant
Professor, Radiology

University of Wisconsin - Madison
School of Veterinary Medicine
Department of Surgical Sciences
2015 Linden Drive West
Madison, WI 53706
(608) 263-9808
7/1/92 - 7/1/94

Clinical Instructor
Radiology

North Carolina State University
College of Veterinary Medicine
Department of Radiology
Raleigh, NC 27606
(919) 821-9590
7/3/89 - 6/30/92

Resident, Radiology

Cherry Hill Animal Hospital
1425 E. Marlton Pike
Cherry Hill, NJ 08034
(609) 429-4394
6/13/88 - 6/25/89

Staff Veterinarian

Metcalf MR, Forrest LJ, Sellett LC. Scintigraphic Pattern of 99-m-Tc-MDP Uptake in Exercise Induced Proximal Phalangeal Trauma in Horses. Vet Rad, 1990;31:17-21.

Huml RA, Konde LJ, Sellon RK, Forrest LJ. Gastrogastric Intussusception in a Dog. Vet Rad & Us, 1992; 33:150-153.

Forrest LJ. Radiology Corner. Advantages of the Three View Radiographic Examination in Instances Other than Metastasis. Vet Rad & Us, 1992; 33:340-341.

Forrest LJ, Dodge RK, Page RL, Heidner GL, McEntee MC, Novotney CA, Thrall DE. Relationship Between Quantitative Tumor Scintigraphy and Time to Metastasis in Dogs with Osteosarcoma. J Nucl Med 1992;33:1542-1547.

Huml RA, Khoo LH, Stoskopf MK, Forrest LJ. Radiographic Diagnosis. Vet Rad & Ultrasound, 1993; 34:178-180.

Bagley RS, Forrest LJ, Cauzinille L, Hopkins AL, Kornegay JN. Cervical Vertebral Fusion and Concurrent Intervertebral Disc Extrusion in Four Dogs. Vet Rad & Ultrasound, 1993; 34:336-339.

Forrest LJ, Thrall DE. Bone Scintigraphy for Metastasis Detection in Canine Osteosarcoma. Vet Rad & Ultrasound, 1994;35:124-130.

Trostle SS, Forrest LJ, Wilson DG, Brown CE. Osteomyelitis of the lateral malleolus and septic arthritis of the talocrural joint in a bull secondary to *Rhodococcus equi* infection - What's your diagnosis? J Am Vet Med Assoc, 1995;206:11:1695-1696.

Forrest LJ, Thrall DE. Oncologic Applications of Diagnostic Imaging Techniques. Vet Clin North Am (Small Anim Pract) 1995;25(1):185-205.

O'Brien RT, Forrest LJ. A retrospective study of umbilical ultrasound in calves. Vet Radiol & Ultrasound, 1996;37:63-67.

Forrest LJ, Baty CJ, Metcalf MR, Thrall DE. Feline hyperthyroidism: Efficacy of treatment using volumetric analysis for radioiodine dose calculation. Vet Radiol & Ultrasound, 1996;37:141-145.

Hartup BK, Steinberg H, Forrest LJ. Cholangiocarcinoma in a red-tailed hawk (*Buteo jamaicensis*). J Zoo Wild Anim Med, accepted 12/95.

Forrest LJ. Combination cancer treatment: Surgery and radiation therapy. Vet Med, accepted 5/96.

Forrest LJ, Dubielzig RR, MacEwen EG. Peripheral neuroblastoma in a dog. Re-submitted to Vet Radiol Ultrasound 10/9/96.

Carroll GL, Keene BW, Forrest LJ. A brief report: Asystole associated with iohexol myelography. Submitted to Veterinary Radiology and Ultrasound 8/95.

ABSTRACTS

Forrest LJ, Sellet LC, Malone D, Thrall DE. Bone Scintigraphy in Limb Sparing for Osteosarcoma: Prediction of Tumor Response, Allograft Incorporation and Assessment of Metastasis. American College of Veterinary Radiology Meeting, Chicago, IL; November 29 - December 1, 1990.

Forrest LJ, Baty CJ, Malone D, Metcalf MR, Thrall DE. Feline Hyperthyroidism: Nuclear Imaging and Treatment with Radioactive Iodine. American College of Veterinary Radiology Meeting, San Francisco, CA; October 13-17, 1991.

Mahler P, Forrest LJ, Vail DM, MacEwen EG, Kinsella TJ. A Large Animal Model of Radiation Pneumonitis: CT Findings. Radiation Research Society - 42nd annual meeting, Nashville, TN; April 29 - May 4, 1994

Forrest LJ, Mahler PA, Vail DM, Mackie TR, Kinsella TJ. Computed tomographic evaluation of radiation pneumonitis in a canine model. International Veterinary Radiology Association - 10th meeting, Philadelphia, PA; August 1-6, 1994.

Mahler PA, Vail DM, MacEwen EG, Forrest LJ, Kinsella TJ. Possible immunological aspects of radiation pneumonitis: Experimental investigations. American Society for Therapeutic Radiology and Oncology - 36th annual meeting, San Francisco, CA; October 2-6, 1994.

Hartup BK, Steinberg H, Forrest LJ. Cholangiocarcinoma in a red-tailed hawk (*Buteo jamaicensis*). Joint conference of the American Association of Zoo Veterinarians, Wildlife Disease Association and American Association of Wildlife Veterinarians, Lansing, MI; August 12-17, 1995.

Mahler PA, Vail DM, MacEwen EG, Forrest LJ, Kinsella TJ. Computed tomographic evaluation of lung volume and lesions in a canine model of radiation pneumonitis. 10th International Congress of Radiation Research, Wuerstburg, Germany; August 27 - September 1, 1995.

Forrest LJ, Graybush CA. Radiographic patterns of pulmonary metastais in cats. 15th Annual Veterinary Cancer Society meeting, Tucson, AZ; October 21-24, 1995.

Shorr RGL, MacEwen G, Forrest L, Conover C, Shum K. The use of oxygen carriers for the treatment of cancer: regression of canine nasal carcinoma with combined polyethylene glycol (PEG) conjugated hemoglobin and irradiation treatment. American Assoc. for Cancer Research- vol 37, March 1996.

Forrest LJ, Miller PM, Dubielzig RR. Radioprotective effects of topical WR-1065 in the guinea pig model of radiation induced ocular injury. Companion Animal Grant, $8,415.00. Funded.

Webster JG, Will JA, Mackie TR, Forrest LJ. Electrode design for cardiac tachyarrhythmia RF ablation. Resubmitted to NIH, 2/96, total request: $1,040,594.

Forrest LJ, Vail DM, Chun R. Abrogation of radiation induced mucositis with oral administration of an acemannan containing gel in a murine model. Companion Animal Grant, $3,100.00. Funded.

Forrest LJ, Vail DM, Mahler, PA. Veterinary information on-line: Linking Wisconsin veterinarians with the University. Re-submitted to Wisconsin Advanced Telecommunications Foundation 6/14/96, requested amount: $18,780.98.

CONTINUING EDUCATION

Ultrasound for the Nineties for the Small Animal Practitioner.
March 26 & 27, 1993.
Short course for the practitioner. Lectured on "Mass" and "Met" Imaging and instructed in 3 laboratories on ultrasound imaging and biopsy techniques.

Post Graduate Conference.
June 18 & 19, 1993.
Lectured on Radiation Therapy for Veterinary Cancer Patients.

Ultrasound for the Nineties for the Small Animal Practitioner.
July 9 & 10, 1993.
Short course for the practitioner. Lectured on "Mass" and "Met" Imaging and instructed in 3 laboratories on ultrasound imaging and biopsy techniques.

Saturday Enrichment Program.
Developed 45 minute program for 5th - 8th graders as an introduction to Veterinary Medicine. Students were able to develop their own radiograph and to view and discuss numerous radiographs of many different animals.

Ultrasound for the Nineties for the Small Animal Practitioner.
July 15 & 16, 1994.
Short course for the practitioner. Lectured on "Mass" and "Met" Imaging and "Kidney & Bladder Imaging" and instructed in 6 laboratories on ultrasound imaging and biopsy techniques.

Wisconsin Veterinary Medical Association Annual Meeting.
October 14-16, 1994
Gave a 90 minute seminar on Diagnostic Imaging in the Cancer Patient and Radiation Therapy as a Treatment Modality for Cancer Patients.

Feline Echocardiography and Abdominal Ultrasound - Madison, WI.
July 14-15, 1995.
Short course for the practitioner. Lectured on "Kidney and Bladder Imaging" and instructed in two laboratories on ultrasound imaging.

CONTINUING EDUCATION

Lisa J. Forrest

10th Annual Feline Conference - Madison, WI.
September 16, 1995.
Gave one hour lecture on Feline Ultrasound and participated in afternoon case discussions.

Three hours of Continuing education to the Coulee Veterinary Group in Sparta, WI.
Presented thoracic and abdominal small animal cases to a group of 15 Veterinarians.
November 1, 1995

Large Animal Ultrasound - Madison, WI.
November 10-11, 1995.
Course Coordinator and participated in 3 laboratories.

Wisconsin Veterinary Technician Association - Annual Spring meeting.
Sunday, April 14, 1996.
Gave a 1 hour lecture on "Helpful Hints for Orthopedic Radiography" and a 3 hour wet lab on thorax and abdomen positioning and technique adjustments.

Postgraduate Conference - Madison, WI.
June 14-15, 1996.
Gave 15 minute update on Palliative Radiation for Osteogenic Sarcoma and two 90 minute labs on Pulmonary Patterns: Identification and Interpretation.

Basic Ultrasound for the Small Animal Practitioner - Madison, WI.
June 28-29, 1996.
Will lecture on "Kidney and Bladder Imaging" and "Mass and Met Imaging" and participate in 3 laboratories.

MEETINGS ATTENDED

Computed Tomography Conference
University of Wisconsin, Madison, WI
March 3 & 4, 1993

Tenth Marquette Life Sciences Symposium - Cell Cycle.
Marquette University, Milwaukee, WI
March 12 & 13, 1993

American College of Veterinary Radiology Meeting
Chicago, IL
December 1-5, 1993

International Veterinary Radiology Association - 10th Meeting
Philadelphia, PA
August 1-6 1994

American Society for Therapeutic Radiology and Oncology 36th Annual Meeting.
San Francisco, CA
October 2-6, 1994

MEETINGS ATTENDED

Lisa J. Forrest

American College of Veterinary Radiology - Annual meeting
Honolulu, HI
August 5-11, 1995

15 th Annual Veterinary Cancer Society Meeting.
Tucson, AZ
October 22-24, 1995

Chemoradiation
Chicago, IL
September 28-29, 1995

ASTRO Spring Refresher Course.
Chicago, IL
March 15-16, 1996.

APPLICANTS TRAINING AND EXPERIENCE

TRAINING RECEIVED IN BASIC RADIOISOTOPE HANDLING TECHNIQUES

Dr. Lisa J. Forrest

TOPICS	WHERE TRAINED	DURATION & TYPE[1] OF TRAINING
Principals and practices of radiation protection	University of North Carolina North Carolina State University	60 Hours (C) 53 Hours (C) 3 Years (J)
Biological Effects of radiation	University of North Carolina University of Wisconsin-Madison North Carolina State University	35 Hours (C) 20 Hours (C) 3 Years (J)
Basic calculations for radioactivity measurement and standardization	University of North Carolina North Carolina State University	60 Hours (C) 53 Hours (C) 3 Years (J)
Instrumentation and monitoring techniques	University of North Carolina North Carolina State University	60 Hours (C) 53 Hours (C) 3 Years (J)
Other (describe)		

[1]Please indicate on the job (J) or formal course (C).

EXPERIENCE - Use of radioactive materials, sources, instruments etc.

RADIONUCLIDE	ACTIVITY USED (mCi) avg/max	TYPE OF USE	DURATION OF EXPERIENCE
Technetium	20 mCi / 250 mCi	Diagnostic nuclear imaging in cats, dogs and horses	3 Years
I-131	4 mCi / 5.5 mCi	Thyroid ablation in cats	3 Years

CURRICULUM VITAE

NAME: Steven Scott Trostle **SOCIAL SECURITY NUMBER**: 201-52-9998

DATE OF BIRTH: January 14, 1963 **PLACE OF BIRTH:** York , PA

PRESENT ADDRESS: University of Wisconsin
School of Veterinary Medicine
Department of Surgical Sciences
2015 Linden Dr. West
Madison, WI 53706-1102

TEL: 608-265-3410
FAX: 608-263-7930
E-Mail: trostles@svm.vetmed.wisc.edu

EDUCATION

1991-1994	Residency, Large Animal Surgery School of Veterinary Medicine, University of Wisconsin-Madison, Madison, WI 53706-1102
1987-1990	Doctor of Veterinary Medicine College of Veterinary Medicine University of Tennessee, Knoxville, TN 37901-1071
1984-1986	Master of Science, Animal Science/Reproductive Physiology College of Agriculture Pennsylvania State University, University Park, PA 16801
1980-1984	Bachelor of Science, Animal Husbandry Delaware Valley College of Science and Agriculture Doylestown, PA 18901

SPECIALTY BOARDS

1996	Diplomate American College of Veterinary Surgeons

PROFESSIONAL EXPERIENCE

7/96 - *Present*	Clinical Assistant Professor - Department of Surgery, Large Animal Surgery Section School of Veterinary Medicine, University of Wisconsin, Madison, WI.
9/95 - 6/96	Clinical Instructor - Department of Surgery, Large Animal Surgery Section School of Veterinary Medicine, University of Wisconsin, Madison, WI.
8/94-8/95	Clinical Instructor - Equine Surgery and Nuclear Medicine Marion duPont Scott Equine Medical Center, Leesburg, VA
7/91-6/94	Resident, Department of Surgical Sciences, Large Animal Surgery Section School of Veterinary Medicine, University of Wisconsin, Madison, WI.
6/90-6/91	Associate Veterinarian Town and Country Animal Hospital, Centreville, MD

PROFESSIONAL AFFILIATIONS

1996 American College of Veterinary Surgeons
1990 American Veterinary Medical Association
1990 American Association of Equine Practitioners
1990 Pennsylvania State Veterinary Medical Association

LICENSURE

1994 California
1992 Wisconsin
1990 Maryland
1990 Pennsylvania
1990 Virginia

HONORS AND AWARDS

1995 ACVS Outstanding Research Paper
1990 American College of Veterinary Surgeons Award, University of Tennessee
1990 Upjohn Large Animal Medicine and Surgery Award, University of Tennessee
1990 Hal and Bel Reagan Large Animal Scholarship, University of Tennessee
1988 Outstanding College Students In America, University of Tennessee
1988 Who's Who of Students in Medicine, University of Tennessee
1984 Who's Who Among American Colleges and Universities, Delaware Valley College
1984 Delta Tau Alpha Outstanding Senior, Delaware Valley College
1983 Delta Tau Alpha Agriculture Honor Society, Delaware Valley College
1983 Deep Run Packing Scholarship, Delaware Valley College
1982 American Society of Animal Scientist Undergraduate Scholarship, Delaware Valley College
1981 Block and Bridle Scholarship, Delaware Valley College

REFEREED PUBLICATIONS

Trostle SS, Hendrickson DA, Stone WC, Nolhnen AAO. Use of antimicrobial-impregnated polymethyl methacrylate in the treatment of chronic refractory septic arthritis and osteomyelitis of the digit in a bull. *J Am Vet Med Assoc* 1996;208:404-407.

Trostle SS, Hendrickson DA. Suture sinus formation as an incisional complication following abdominal wall closure using polypropylene in horses. *J Am Vet Med Assoc* 1995; 207:742-745.

Trostle SS, Semrad SD, Hendrickson DA. Tracheal perforation in the horse. *Comp Contin Educ Pract Vet* 1995;17:952-959.

Trostle SS, Wilson DG, Hanson PD, Brown CE. Management of a radius fracture in an adult bull. *J Am Vet Med Assoc* 1995; 206:1917-1919.

Trostle SS, Wilson DG, Forrest LJ, Brown CE. What's your diagnosis? *Rhodococcus equi* septic arthritis, osteomyelitis in a bull. *J Am Vet Med Assoc* 1995; 206:1695-1696.

REFEREED PUBLICATIONS

Trostle SS, Wilson DG, Dueland RT, Markel MD. In vitro biomechanical comparison of solid and tubular interlocking nails in neonatal bovine femora. *Vet Surg* 1995;24::235-243

Trostle SS, Wilson DG, Stone WC, Markel MD. A study of the biomechanical properties of the adult equine linea alba: Relationship of tissue bite size and suture material to breaking strength. *Vet Surg* 1994;23:435-441.

Stone WC, Trostle SS, Gerros TC. The use of a primary muscle pedicle flap to repair a caudal thoracic wound in a horse. *J Am Vet Med Assoc* 1994;205: 828-833.

Trostle SS, Rosin E. Selection of prosthetic mesh implants. *Comp Contin Educ Pract Vet* 1994;16:1147-1158.

Trostle SS, Dubielzig RR, Beck KA. Examination of frozen cross sections of cervical spinal intersegments in nine horses with cervical vertebral malformation: Lesions associated with spinal cord compression. *J Vet Diagn Invest* 1993;5:423-431.

Trostle SS and Markel MD. Incarceration of the large colon in the gastrosplenic ligament of a horse. *J Am Vet Med Assoc* 1993;202:773-775.

Trostle SS, Wilson DG. Steinberg HH, Dzata G, Dubielzig RR. Antemortem diagnosis and attempted treatment of *(Halicephalobus) Micronema deletrix* in a horse. *Can Vet J* 1993;34:117-118.

Trostle SS, The effects of postpartum status and GnRH in suckled beef cows treated with norgestomet and prostaglandin. *Thesis 1986*

PUBLICATIONS - SUBMITTED/ IN PREPARATION

Trostle SS, White NA, Donaldson LD, Freeman LJ, Hendrickson DA. Laparoscopic colopexy in the horse. *Equine Vet J* 1996

Goodrich L, Trostle SS. What's your diagnosis? Long collateral ligament avulsion of the tarsus in a horse. *J Am Vet Med Assoc* 1996

Lopez, MJ, Nordberg C, Trostle SS. Caudal cervical fracture presenting as a radial nerve paralysis in a horse. *Can Vet J* 1996

Klohnen A, Trostle SS, Stone WC, Johanningmeier D, Wilson DG, Hendrickson DA. Management of a pathological fracture of the distal phalanx in a horse. *Can Vet J* 1996

Stone WC, Bjorling DE, Trostle SS, Hanson PD, Markel MD. Prepubic urethrostomy in small ruminants for urethral obstruction: Clinical description in sheep and goats. *J Am Vet Med Assoc* 1996

Murray MD, Cavey MD, Feldman BF , Trostle SS, White NA. Signs of sympathetic dnervation associated with a thoracic melanoma in a horse. *J Vet Int Med* 1996

Donaldson LD, Trostle SS, White NA, The effects of abdominal insufflation with 15 mm Hg of carbon dioxide on cardiopulmonary measurements in dorsally recumbent halothane anesthetized horses. *Vet Surg* 1996

Trostle SS, O'Brien RO, Stone WC. Diagnostic imaging of the bovine mammary gland. *Comp Contin Educ Pract Vet*

BOOK CHAPTERS

Trostle SS, Markel MD. Advances in Ruminant Orthopedics. Fracture Biology, Biomechanics and Internal Fixation. *Vet Clin North AM [Food Anim Pract]*, 1996;12 :19-46

Trostle SS, Markel MD. Advances in Ruminant Orthopedics. Fractures of the Femur. *Vet Clin North AM [Food Anim Pract]*, 1996;12:169-180.

BOOK CHAPTERS - SUBMITTED/IN PREPARATION

Trostle SS. Laparoscopy and laparoscopic procedures of the large animal abdominal cavity. In: *Veterinary Endo-Surgery*, Freeman LJ ed 1997

Trostle SS, Hartman FA. Surgical infection In: *Equine Surgery*, Auer JA ed. 1997

NON-REFERRED PUBLICATIONS

Trostle SS. Nuclear Scintigraphy in the diagnosis of lameness in Thoroughbreds. *The Thoroughbred Owner* July 1995;14-15.

PROCEEDINGS/ABSTRACTS

Trostle SS, White NA, Donaldson LA, Freeman L, Hendrickson DA. Laparoscopic colopexy in a horse *Vet Surg* 1996;25:438.

Donaldson LD, Trostle SS, White NA. Cardiopulmonary changes during laparoscopic colopexy in dorsally recumbent horses anestnesized with halothane in oxygen. *Vet Surg* 1996;25:181.

Trostle SS, Wilson DG, Stone WC, Markel MD. Biomechanical study of suture pullout in the adult equine linea alba. *Vet Surg* 1993;22:403.

Trostle SS, Wilson DG, Dueland TA, Markel MD. A biomechanical study of solid and tubular interlocking nails in bovine femora. *Vet Surg* 1993:22:403.

Trostle SS, Cash EH, Griel LC, O'Connor MC, and Deaver DR. The effects of postpartum status and GnRH on pregnancy rates in suckled beef cows. 1986 *J Anim Sci, 63 (Suppl I):327.*

Trostle SS, Deaver DR, and Tanabe TY. The effects of frequent bleeding on estrous cycle length, duration of estrus and fertilization rates in dairy cattle. 1986 *J Anim Sci, 63 (Suppl I):149.*

RESIDENT TRAINING

1996 - *present*	Donna Shetko, DVM
1995 - *present*	Mandi Lopez, DVM
1995-1996	Andreas Klohnen, DVM
1994-1995	Patricia Doyle, DVM
1994-1995	Laurie Goodrich, DVM, MS
1994-1995	Kelly Farnsworth, DVM

APPOINTMENTS

School of Veterinary Medicine

1996	Equity Action Commitee
1996	Search committee for third shift Veterinary Technician in the Large Animal Clinic
1995 - present	Nuclear Medicine Development Committee

Department of Surgical Sciences

1996	Search Committee - Anesthesia Staff Veterinarian
1996	Search Committee - Large Animal Surgery

COURSES TAUGHT

1996- *present*	938-746 Food Animal Surgery Didactic Laboratory, Co-coordinator School of Veterinary Medicine, University of Wisconsin-Madison, Madison, WI
1996- *present*	938-631 Large Animal Surgery. (8 lectures\year) School of Veterinary Medicine, University of Wisconsin-Madison, Madison, WI
1991-*present*	938-633 Large Animal Surgery Laboratory. (4 labs\year) School of Veterinary Medicine, University of Wisconsin-Madison, Madison, WI
1995-*present*	938-747 Equine Lameness Didactic Laboratory, (1 lecture\year) School of Veterinary Medicine, University of Wisconsin-Madison, Madison, WI
1995-*present*	938-642 Large Animal Surgery Clinical Rotation (30 weeks\year) School of Veterinary Medicine, University of Wisconsin-Madison, Madison, WI
1994-1995	VM9544 Equine Medical Center, Surgical Service (44 weeks of clinical service) Marion duPont Scott Equine Medical Center Leesburg, VA
1986	492 Beef Production, Reproductive Management of the Beef Herd Lecture (4 lectures/4 labs) Penn State University, University Park, PA
1985-1986	490 Advanced Reproductive Physiology Laboratory, (10 labs\year) Penn State University, University Park, PA
1984-1986	324 Livestock Performance and Evaluation, (30 labs\year) Penn State University, University Park, PA

PRESENTATIONS

Scientific Meetings

11/3/96	Laparoscopic colopexy in the horse. American College of Veterinary Surgeons. San Francisco, CA
10/26/93	A biomechanical study of suture pullout in the adult equine linea alba. American College of Veterinary Surgeons. San Francisco, CA
10/26/93	A biomechanical study of solid and tubular interlocking nails in bovine femora. American College of Veterinary Surgeons. San Francisco, CA
08/01/86	The effects of postpartum status and GnRH on pregnancy rates in suckled beef cows. National Meeting American Society of Animal Scientists. Manhattan, KS
07/08/86	The effects of frequent bleeding on estrous cycle length, duration of estrus and fertilization rates in dairy cattle. Northeast Regional Meeting American Society of Animal Scientists, Providence, RI

Faculty Seminars

2/4/95	The use of once daily dosing of aminogylcosides Marion duPont Scott Equine Medical Center, Leesburg, VA

PRESENTATIONS

Continuing Education

11/15-16/96	Large Animal Ultrasound Shortcourse University of Wisconsin School of Veterianry Medicine, Madison, WI
10/18/96	Treating the Valuable Neonatal Calf Wisconsin Veterinary Medical Association Meeting, Madison, WI
2/24/95	Preventing and Treating Trailer Injuries and Trauma The United States Trail Ride, Inc., Trailer Safety Clinic, Leesburg, VA
10/8/94	Nuclear Medicine in Horses Marion duPont Scott Equine Medical Center Open House, Leesburg, VA
04/27/93	Preparing Your Horse for a Pack Trip Dane County Equestrian Club, Madison, WI
03/09/93	Use of Prosthetic Mesh Implants In General Surgery Greater Rockford Veterinary Medical Association, Rockford, IL
06/19/92	Typhlectomy in the Bovine Postgraduate Conference, Madison, WI
04/05/92	Management of Crooked Legs in Foals. Midwest Horse Fair. Madison, WI.

Continuing Education

09/29/91 Normal Equine Confirmation.
5th Annual Fall Horseman's Conference, University of Wisconsin-Madison.

Instructional Videotapes

11/06/92 Instructional Videotape: Scrubbing, Gowning and Gloving
University of Wisconsin-Madison, School of Veterinary Medicine

Instructional Audiotapes

07/95 Trostle SS, Semrad SD, Hendrickson DA. Tracheal perforation in the horse. *Comp Contin Educ Pract Vet*

Instructional Teleconferences

01/30/92 Management of Crooked Legs in Foals.
Educational Teleconference Network, University of Wisconsin Extension Service.

GRANTS

In vivo comparison between solid interlocking nails and intramedullary pins in oblique, mid diaphyseal femoral osteotomies in calves. Trostle SS, Wilson DG. School of Veterinary Medicine, University of Wisconsin-Madison, Food Animal Fund $9600.

Evaluation of COSEQUIN in induced arthritic disease of the horse: A pilot study. White NA, Furr MO, Trostle SS. Nutramax Laboratories, Inc. $8,000

Laparoscopic colopexy for the techniques for the prevention and treatment of large colon displacement and volvulus in the horse. Trostle SS, White NA, Hendrickson DA, Clem MF, Freeman LJ. Virginia-Maryland Regional College of Veterinary Medicine, Clinical Initiative Grant, $5030 & Ethicon Endosurgery $8,000.

The effects of abdominal insufflation with 15 mm Hg of carbon dioxide on cardiopulmonary measurements in dorsally recumbent halothane anesthetized horses. Trostle SS, Donaldson LD, White NA, Hendrickson DA. Virginia-Maryland Regional College of Veterinary Medicine, Clinical Initiative Grant, $5030.

A biomechanical study of solid and tubular interlocking nails in bovine femora. Dueland TA, Wilson DG, Trostle SS. School of Veterinary Medicine, University of Wisconsin-Madison, Food Animal Fund $14,480

Biomechanical study of suture pullout in the adult equine linea alba. Wilson DG, Stone WC, Trostle SS. School of Veterinary Medicine, University of Wisconsin-Madison, Companion Animal Fund $5,450

MEETINGS ATTENDED

11/96 31st Annual Meeting, American College of Veterinary Surgeons, San Francsico, CA

10/95 30th Annual Meeting, American College of Veterinary Surgeons,Chicago, IL

10/94 29th Annual Meeting, American College of Veterinary Surgeons, Washington, DC

9/94 Equine Nuclear Medicine Workshop, University of Illinois, Champaign, IL

7/94 Society of American Gastrointestinal Endoscopic Surgeons, Endoscopy and Laparoscopy Workshop for Residents, Ethicon, Endosurgery, Cincinnati, OH

10/93 28th Annual Meeting, American College of Veterinary Surgeons, San Francisco, CA

03/93 6th Annual Meeting, Advanced Course Surgical Fixation of Fractures and Non-Unions, Equine Section, Columbus, OH

03/92 23rd Annual Meeting, Basic Course Surgical Fixation of Fractures and Non-Unions, Equine Section, Columbus, OH

APPLICANTS TRAINING AND EXPERIENCE

Complete a separate sheet for each applicant (make copies if necessary).

Dr. Steve Trostle

TRAINING RECEIVED IN BASIC RADIOISOTOPE HANDLING TECHNIQUES

TOPICS	WHERE TRAINED	DURATION & TYPE[1] OF TRAINING
Principles and practices of radiation protection	Equine Nuclear Medicine Workshop VA-MD Regional College of Veterinary Medicine	3 days (C) 1 year (J)
Biological effects of radiation	Equine Nuclear Medicine Workshop VA-MD Regional College of Veterinary Medicine	3 days (C) 1 year (J)
Basic calculations for radioactivity measurement and standardization.	Equine Nuclear Medicine Workshop VA-MD Regional College of Veterinary Medicine	3 days (C) 1 year (J)
Instrumentation and monitoring techniques.	Equine Nuclear Medicine Workshop VA-MD Regional College of Veterinary Medicine	3 days (C) 1 year (J)
Other (describe) -		

[1]Please indicate on the job (J) or formal course (C).

EXPERIENCE - Use radioactive materials, sources, instruments etc.

RADIONUCLIDE	ACTIVITY USED (mCi) avg	ACTIVITY USED (mCi) max	TYPE OF USE	DURATION OF EXPERIENCE
Technectium	200	12,000	Diagnostic nuclear medicine evaluation of lameness in horses	VA-MD Regional College of Veterinary Medicine 1 year

NUCLEAR MEDICINE PROTOCOLS - SVM

ADRENAL IMAGING:

RADIOPHARMACEUTICAL:

CHOICE:

ADRENAL CORTEX:

Originally **I-131-19-iodocholesterol**, replaced by:

NP-59 I-131-6ß-iodomethyl-19-norcholesterol

SMC, SCINTADREN S3-75-6ß-selenomethyl-19-norcholesterol

ADRENAL MEDULLA:

I-131-MIBG OR **I-123-MIBG**

SCANNING PROTOCOL:

RADIOCHOLESTEROL IMAGING:

1mCi (37 MBq) per 1.7 m^2

Image 5-7 days post injection if non-dexamethasone suppression
3-5 days if dex. suppression.

Image for 20 minutes or 100 kcts.

ADRENAL MEDULLAR IMAGING:

5 mCi (185 MBq) I-123-MIBG for a 10 pound dog.

Image at 4, 18 and 24 hours for 300 kcts.

BONE SCINTIGRAPHY:

RADIOPHARMACEUTICAL: ^{99m}Tc-Methylene diphosphonate (^{99m}Tc-MDP)

Route: Intravenous (IV)

SCANNING PROTOCOL:

Equine Dose: 80-130 mCi
Dog Dose: 5 - 20 mCi
Cat Dose: 5 - 10 mCi

Three Phase Bone Scan:

1. Initial dynamic flow study of area of interest, with rapid sequential images ever 2-3 sec. for 30 sec.
2. Blood pool image at 5 min.
3. Delayed bone images at 2-4 hours.

BRAIN SCINTIGRAPHY:

RADIOPHARMACEUTICAL:

^{99m}Tc-GHA (glucoheptonate), ^{99m}Tc- DTPA, TcO_4^- (pre-treat with perchlorate)

Route: IV

SCANNING PROTOCOL:

CANINE DOSE: 5 - 20 mCi

Scan at least 2 hours (preferable 4-6 hrs.) post injection.

CARDIAC SCINTIGRAPHY:

RADIOPHARMACEUTICAL:

CHOICE: Blood Pool Agents

TcO4-:	First pass - most commonly used.
Tc-DTPA:	First pass studies - if rapid clearance desired
Tc-GH:	First pass studies - if rapid clearance desired
Tc-MAA:	First pass studies - quantify RT - LT shunts
Tc-RBC:	Gated studies
Tc-HSA:	Gated studies

SCANNING PROTOCOL:

GATED STUDIES:

DOSE:	Cat:	5 mCi
	Dog:	15-20 mCi
	Horse:	50-75 mCi

FIRST PASS:

DOSE:	Cat:	5 mCi
	Dog:	5-20 mCi
		2-5 mCi for Tc-MAA
	Horse:	20-100 mCi

GASTROINTESTINAL SCINTIGRAPHY:

RADIOPHARMACEUTICAL:

CHOICE:

SOLID PHASE GE: Tc-SC + chicken liver, egg, baby food
Resin beads
Tc-DISIDA

GI BLEEDS: Tc labeled RBC

ESOPHAGEAL MOTILITY: Tc-SC
TcO4

GE REFLUX: Tc-SC

GASTRIC SECRETORY FUNCTION: TcO4

INFECTION/INFLAMMATORY: Tc-phosphates
Tc-leukocytes
In-WBC
Gallium-67

SCANNING PROTOCOL:

ESOPHAGEAL MOTILITY:

Tc-SC or **TcO4** --- per os

Dynamic series of 0.5 second images over 10-20 seconds.

Repeated swallows induced until esophagus clears.

GI REFLUX:

50-100 uCi **Tc-SC** --- per os or via stomach tube

Position animal with cranial abdomen/caudal thorax over camera

Ventral images - best definition of GE junction

Dynamic images for 20-60 minutes.

ROI --- stomach & esophagus
A small amount of reflux within the first 6 minutes is normal.
Good screening test

GASTRIC EMPTYING:

Solid phase -- Tc-SC or **Tc-DISIDA**
Mix with baby food and kibble, feed after 18 hour fast.
Allow 15 minutes for meal consumption
Immediately acquire 30 second images
left lateral
right lateral
ventral
Repeat above every 30 minutes
ROI --- stomach (avoid bowel)
DECAY CORRECT COUNTS
Calculate emptying t1/2

ESOPHAGEAL MOTILITY:

Tc-SC or **TcO4** --- per os
Dynamic series of 0.5 second images over 10-20 seconds.
Repeated swallows induced until esophagus clears.
ROI - esophagus ---- % clearance and transit times.

GI REFLUX:

50-100 uCi **Tc-SC** --- per os or via stomach tube
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Allow 15 minutes for meal consumption
Immediately acquire 30 second images
left lateral
right lateral
ventral
Repeat above every 30 minutes
ROI --- stomach (avoid bowel)
DECAY CORRECT COUNTS
Calculate emptying t1/2

INFECTION SCANNING:

RADIOPHARMACEUTICAL:

CHOICE:
Tc-MDP - osteomyelitis (three phase)
Gallium-67-citrate
^{111}In-WBC
^{111}In-Chloride
Tc-HMPAO-WBC

SCANNING PROTOCOL:

Gallium-67-citrate:
6 mCi of gallium IV
Scan 6-72 hours later.
Medium Energy collimator
Multichannel analyzer permits imaging of several Ga gamma peaks. Single channel analyzer - wider window over **93 & 184 keV** peak
Early images for inflammation, later images for tumor.
300 - 500 kcts.
Increased specificity with SPECT

^{111}In-WBC:
Labeling: 2 steps, cell separation & incubation with a radioactive tag.
Dose - 0.5 - 1 mCi
Image 18-24 hours later
Medium Energy collimator, 15% window at 173 & 247 photopeak

In-111-Chloride:
Dose - 0.75-1 mCi
Image at 24 and 72 hours
Medium Energy collimator, 15% window at 173 & 247 photopeak

Tc-HMPAO-WBC:
Lipophilic agent diffuses through the cell membrane at room temperature and binds intracellularly.

LIVER / SPLEEN SCANNING: (RADIOCOLLOID SCANNING)

RADIOPHARMACEUTICAL:

Tc-99m sulfur colloid

SCANNING PROTOCOL:

DOSE: 2 - 6 mCi of Tc-sulfur colloid, depending on the body weight.
Static images - 20 minutes later.

PORTAL SCINTIGRAPHY:

RADIOPHARMACEUTICAL:

CHOICE:

Inert RP:

TcO4

SCANNING PROTOCOL:

TcO4:

12 hour fast, enema at least 2 hours prior to study.
Right lateral recumbancy
12 French catheter with 3-way stop-cock inserted 15-20 cm into colon.
5-20 mCi of TcO4 in 1.5 ml saline, bolus follow with air flush

HEPATOBILIARY IMAGING:

RADIOPHARMACEUTICAL:

CHOICE:

Tc-DISIDA

SCANNING PROTOCOL:

University of Tennessee protocol: small animal
DOSE: **3 - 6 mCi - Tc-DISIDA** - IV bolus
Feed patient 4 - 6 hours prior to scan

LUNG SCANNING:

RADIOPHARMACEUTICAL:

CHOICE:

Tc-MAA - PERFUSION
Tc-DTPA - VENTILATION

SCANNING PROTOCOL:

PERFUSION:

DOSE:

EQUINE: 30 mCi.
DOG: 3-5 mCi.

VENTILATION:

DOSE:

40-60 mCi in an acorn nubulizer in a volume of 4 ml.

LYMPHOSCINTIGRAPHY

RADIOPHARMACEUTICAL:

CHOICE:

99mTc-antimony sulphide colloid - 100-500 uCi

SCANNING PROTOCOL:

0.5 mCi (18.5MBq) injected in webbing between toes.

99mTc-antimony sulfide colloid - images 2 hrs. post injection.

RENAL SCINTIGRAPHY:

RADIOPHARMACEUTICAL:

A) CHOICE:

Tc-DTPA: Completely eliminated by glomerular filtration, NO tubular secretion. MEASURES GFR. GLOBAL RENAL FUNCTION

I-131-OIH (hippuran): Tubular secretion. MEASURES RENAL PLASMA FLOW (ERPF). 80% tubular secretion, 20% glomerular filtration.

Tc-MAG3: Tubular secretion. Distal tubules.

Tc-DMSA: CORTICAL IMAGING AGENT. 50% of the dose accumulates in the cortical tubules within 1 hour and remains in the cortex up to 24 hours. Renal uptake, retention by proximal tubules with less than 5% being excreted.

SCANNING PROTOCOL:

Tc-DTPA DOSE: 2-3 mCi

Give rapid IV bolus (cephalic), scan immediately.

THYROID IMAGING:

RADIOPHARMACEUTICAL:

CHOICE:

TcO_4^-

^{131}I (sodium iodine)

SCANNING PROTOCOL:

DOSE: TcO_4^-

HORSE: 10 mCi

DOG/CAT: 1-3 mCi

Time to scan - 20 minutes.

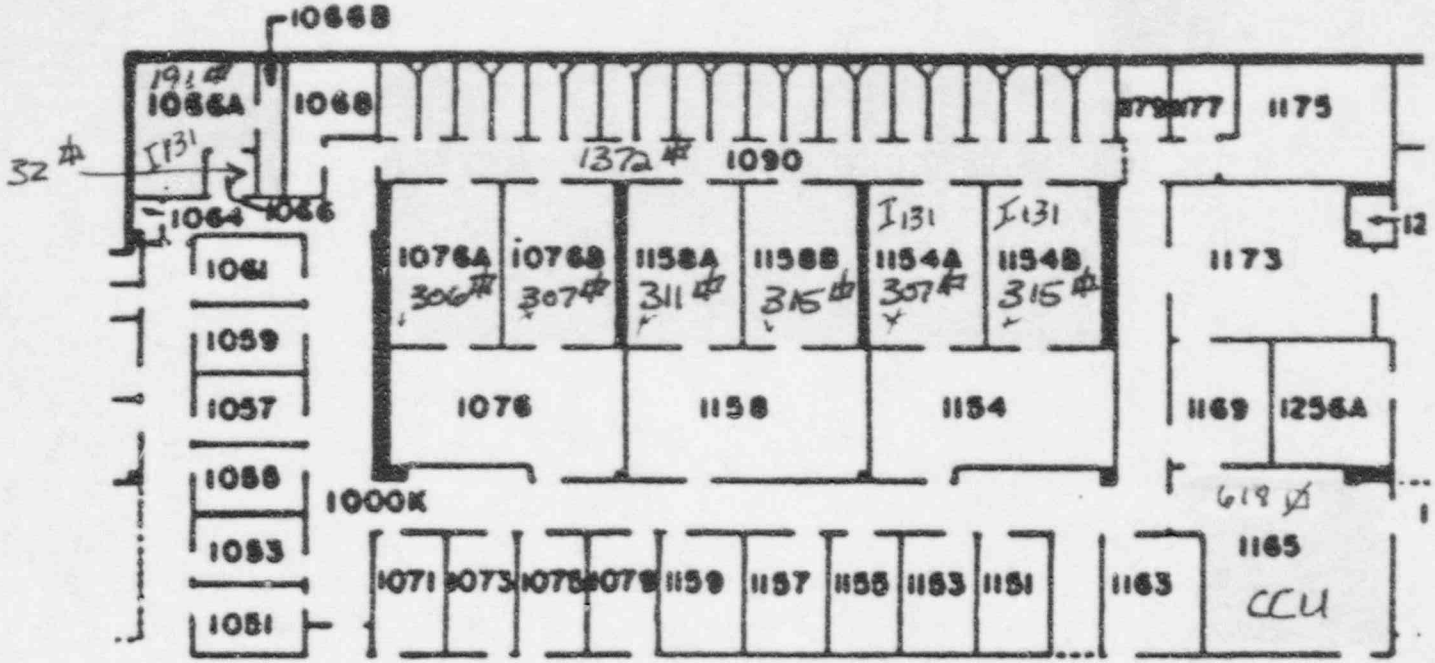
^{131}I

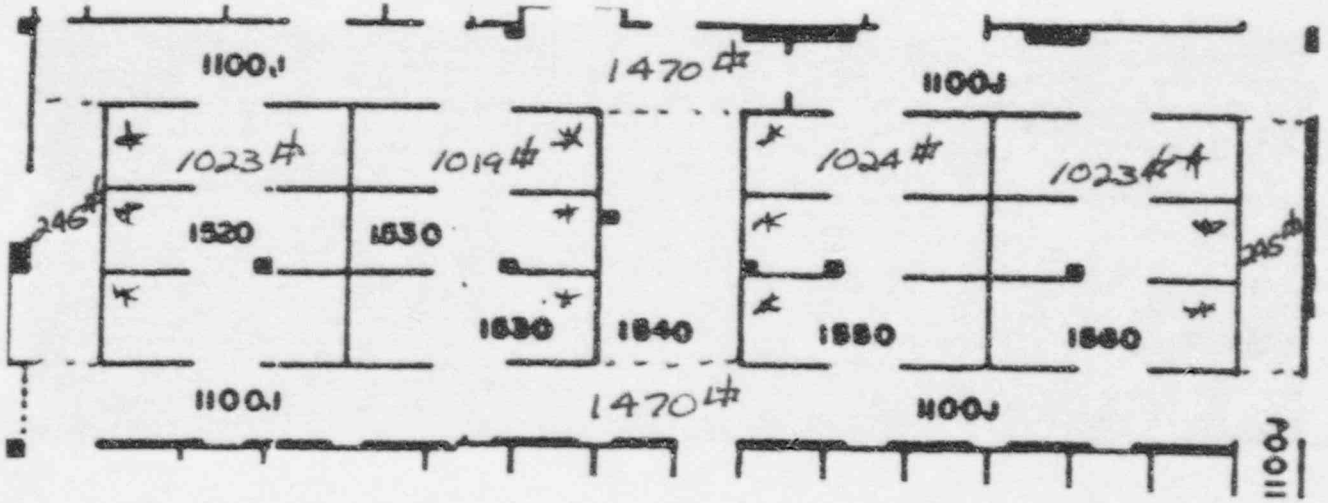
DOG/CAT: 500 uCi

Time to scan - 24 hours.

THERAPUETIC THYROID ABLATION:

Feline hyperthyroidism. Dose of I-131: 2-8 mCi

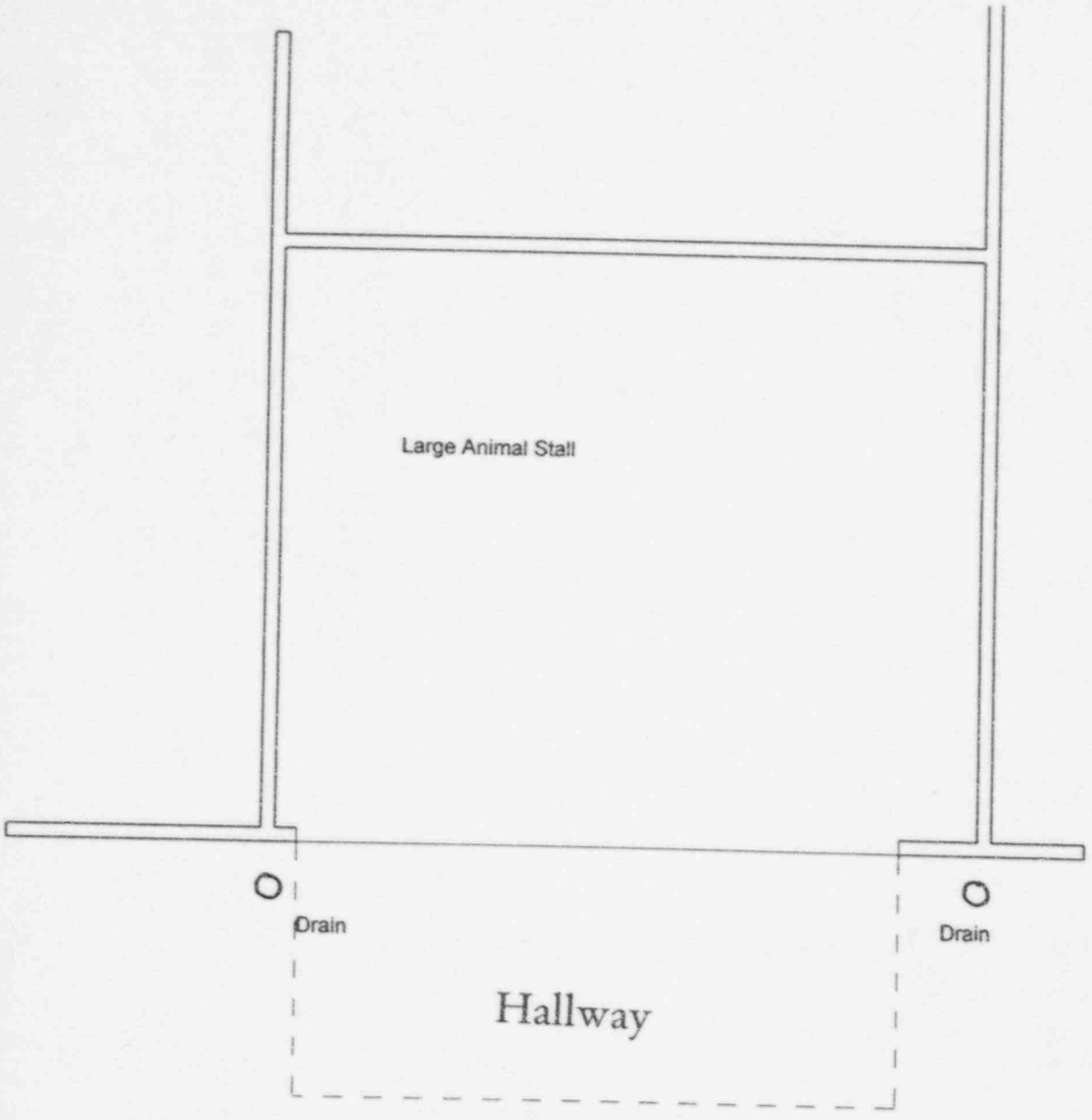


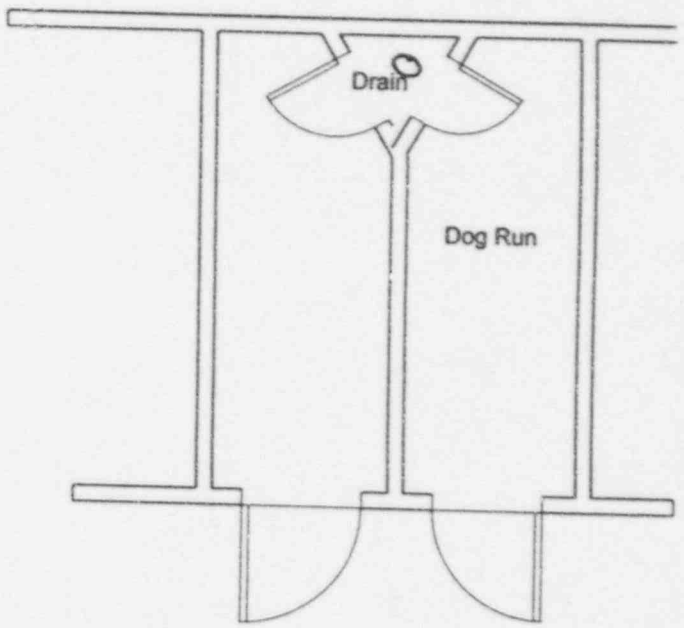


NOT TO SCALE

= SQUARE FEET

Diagram -- Animal Holding Areas





Hallway

OWNER GUIDE TO RADIOIODINE TREATMENT FOR FELINE HYPERTHYROIDISM

The thyroid gland is a small gland located in the neck, which plays an important role in controlling the body's metabolism. It produces thyroid hormones which travel throughout the body. Hyperthyroidism is a result of the thyroid gland releasing too much thyroid hormone. This can cause a variety of symptoms including hyperactivity and nervousness, weight loss, increased appetite, vomiting and poor hair coat.

Hyperthyroidism can be treated in three ways: 1) Surgical excision of the thyroid gland, 2) medical management with antithyroid drugs, and 3) radioiodine therapy. Definitive treatment for hyperthyroidism involves elimination of the hyperfunctioning gland, so that overproduction of thyroid hormone will cease. This can be accomplished by either surgery or radioiodine therapy.

Radioiodine is taken up by the thyroid gland and destroys some of the cells. This reduces the size of the gland and brings the thyroid hormone production back to normal levels.

Your pet will need to stay hospitalized for 1-2 weeks after administration of radioiodine to ensure that there is no unnecessary exposure to radioactivity. After your pet is released to you, you must still take precautions for the next 3-4 weeks. These include:

- Keep you pet strictly confined to your premises during this period. Do not allow your pet to roam freely in the neighborhood.
- Stay 3 feet or further away from your pet, except for brief periods for necessary care. Radiation exposure decreases rapidly with distance.
- Children under the age of 18 and pregnant women should not have any prolonged, close contact with your pet.
- For the first week, minimize close contact with your pet, including arranging to have your pet sleep in a separate room.
- Your pet is still excreting low levels of radioactive iodine. For cats, make sure that your pet uses the litter pan and change the litter daily. Use plastic disposable litter pan liners to minimize handling of litter. For dogs, your pet must not leave your property during the restricted period.
- Wash your hands carefully after handling your pet, its food dishes or litter pan.

If your pet should die or need veterinary attention prior to _____, notify your veterinarian at the School of Veterinary Medicine or Drs. Forrest, Vail or Henik at 608-263-7600.

I have read and understand the radiation safety precautions necessary if my pet is treated with radioiodine and agree to follow them carefully. I request that my animal be treated with radioiodine.

_____ _____

Owner Signature Date

OWNER GUIDE TO DIAGNOSTIC NUCLEAR IMAGING IN COMPANION ANIMALS

Nuclear medicine *(scintigraphy)* is an imaging technique that involves the administration of small quantities of a radioactive material *(radiopharmaceutical)* to the patient. Following administration of the radiopharmaceutical, the radioactivity is distributed throughout the body and localized in different body systems depending on the specific pharmaceutical used. An external detector *(gamma camera)* is then used to create images of the distribution of the radiopharmaceutical and thus provide images that reflect various physiological processes.

The amount of the radiopharmaceutical that is administered is relatively small and produces radiation doses to the patient that are comparable to some of the special procedures used in conventional diagnostic radiography. However, since the radiation is administered to the patient, the patient and the patient's waste (feces and urine) become a source of radioactivity for a short period of time. Because of this potential for exposure to others, care must be exercised in handling nuclear medicine patients so as to minimize the exposure to others. This is done by taking special precautions in handling the patient and by limiting access to the patient for a period of time.

The radiopharmaceuticals used have a very short half-life of only 6 hours. This means that every 6 hours, one-half of the previous radioactivity has decayed. All radioactive decay essentially stops at 10 half-lives or 60 hours. During that 60 hour time period the area (stall/cage) will be identified with a radioactive label or sign to inform personnel in the area. In general, patients will be confined to the UW-VMTH until exposure rate at 1 meter decreases to a level of 2 mR/hr, a safety level determined by the nuclear Regulatory Commission (NRC). Generally this will take approximately 24 hours. During this 24 hour period, owner visitation is not allowed and handling of the animals is minimized and only performed by individuals trained in radiation safety.

After the patient reaches the 2 mR/hr at 1 meter exposure level, they are free to move within the hospital for other diagnostic procedures or be discharged to the owner. No special precautions need to be taken at this time since the radiation level is essentially considered to be at background or below. As an additional precautionary measure to personnel in the hospital, animal waste (feces and urine) will be isolated until the 60 hour period has passed.

I have read and understand the information above and agree to abide by the safety practices described.

_____ _____

Owner/Agent Date

DATE: 10-21-96

CORRESPONDENCE CLARIFICATION SHEET

REVIEWER: ~~BJ HOLT~~ Kevin Null

LICENSEE: Univ of WI

LICENSE NUMBER: 48-09843-18

The following correspondence has been received from the above licensee and it is not clear what action(s) is(are) required: Please review this correspondence and indicate which of the following applies, and please return to Debbie Hersey, as soon as possible.

☐ Additional Information to Control No. _____.
Process in as a new action, additional information, and no fee required.

☐ Process as new licensing action. Review has already been started on Control No._____ and this information cannot be combined with current in-house action.

☐ Can be combined with Control No. _____. Review has not started.

☐ Appears to be information for the license file - file it.

☐ Licensee is adding Nuclear Pharmacists.

Amendment is necessary _____. Amendment is not necessary _____.
(Information for license file)

☐ Licensee is adding authorized users.

A check is included _____. No check is included _____.

Amendment is necessary _____. Amendment is not necessary _____.
(This is a Notification)

☒ Process in as a new licensing action:

A. Amendment X
B. Renewal _____
C. New License Application _____

☐ Other: _____

Thank You For Your Help!!! 10/16/96

NRC FORM 577 (1-95)

U.S. NUCLEAR REGULATORY COMMISSION

LICENSE FEE REQUIREMENTS

LICENSE FEE AND DEBT COLLECTION BRANCH
DIVISION OF ACCOUNTING AND FINANCE
OFFICE OF THE CONTROLLER
U.S. NUCLEAR REGULATORY COMMISSION
WASHINGTON, DC 20555-0001

UNIVERSITY OF WISCONSIN
ATTN: RONALD R. BRESSELL
RADIATION SAFETY OFFICER
30 NORTH MURRAY STREET
MADISON, WISCONSIN 53715-2609

TYPE OF ACTION

- ☐ NEW LICENSE
- ☐ RENEWAL OF LICENSE
- ☒ AMENDMENT TO LICENSE

REQUESTED DATE: 10-15-96

LICENSE NUMBER: 48-09843-18

CONTROL NUMBER: 301978

I. APPLICATION FEE DUE

Your request for a licensing action is subject to the fee(s) in the category(ies) noted below in accordance with Section 170.31 of the enclosed Federal Register notice. Payment of the fee is required prior to the issuance of the license, renewal, or amendment.

FEE CATEGORY	APPLICATION	RENEWAL	AMENDMENT
7B	$	$	$ 580.00
	$	$	$
	$	$	$
	$	$	$
	$	$	$
	$	$	$
	$	$	$
	$	$	$
	$	$	$

FEE(s) DUE	$ 580.00
PAYMENT RECEIVED	$ 0.00
AMOUNT DUE	$ 580.00

☒ Your request was received without the prescribed application fee.

☐ We received your Check No. _____ in the amount of $ _____. Payment of the additional fee noted above is required.

☐ Your request will increase the scope of your license program. Therefore, your request is subject to the application fee(s) noted above. Refer to Section 170.31 and Footnote 1(d)(2).

☐ Your license expired prior to the receipt of your application for renewal. Therefore, your request is subject to the application fee(s) noted above. Refer to Section 170.31 and Footnote 1(a).

MAKE PAYMENT OF THE FEE(S) TO THE U.S. NUCLEAR REGULATORY COMMISSION AND MAIL THE PAYMENT TO THE ADDRESS LISTED AT THE TOP OF THIS FORM. IF WE DO NOT RECEIVE A REPLY FROM YOU WITHIN 30 CALENDAR DAYS FROM THE DATE LISTED BELOW, WE SHALL ASSUME THAT YOU DO NOT WISH TO PURSUE YOUR APPLICATION AND WILL VOID THIS ACTION.

II. FEE NOT REQUIRED

☐ Enclosed is Check No. _____ which accompanied your request. The fee is not required because:

☐ We received your Check No. _____ in payment of the fee.

☐ The Licensing staff has informed us that your request is to be considered as a continuation of your request dated _____, Control No. _____.

☐ Your request was combined, prior to review, with your _____ request, Control No. _____.

III. CHECK RETURNED

☐ Enclosed is Check No. _____ which was returned to us by the bank for:

- ☐ INSUFFICIENT FUNDS
- ☐ ACCOUNT CLOSED
- ☐ OTHER

MAIL THE REPLACEMENT CHECK TO THE ADDRESS LISTED AT THE TOP OF THIS FORM AND REFERENCE THE ABOVE CONTROL NUMBER.

IV. LICENSE ISSUED WITHOUT THE REQUIRED FEE

☐ License No. _____, Amendment No. _____, issued on _____ was issued without the required fee being collected. The fee required is noted in Section I of this form.

☐ The scope of your licensed program was increased. Therefore, your request is subject to the application fee(s) noted in Section 1 of this form. Refer to Section 170.31 and Footnote 1(d)(2).

☐ Because of the urgency of your request, the license was issued without remittance of the prescribed fee noted in Section 1 of this form.

SIGNATURE -- LICENSE FEE ANALYST	LFDCB	LFDCB
Shirley Crutchfield		
SHIRLEY CRUTCHFIELD	11/6/96	

Distribution: OC/DAF/RF
Pending Fee File OC/DAF/SF(LF-3.2.7)
LFARB R/F (2) Region 3

DATE: Nov. 6 1996

NRC FORM 577 (1-95)

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UNIVERSITY OF
WISCONSIN
MADISON

November 13, 1996

U.S. Nuclear Regulatory Commission
ATTN: Shirley Crutchfield
Division of Accounting and Finance, OC/DAF
Office of the Controller
Washington, D.C. 20555-0001

RE: Amendment Fee, Control Number **301978**

Dear Ms. Crutchfield:

We received your letter requesting fee payment under Category 7B of 10 CFR 170.31. We believe that this amendment should be fee exempt as specified under 10 CFR 170.11(a)(4).

This particular amendment is in no way connected to "human use." As seen from the attached letter, it is to begin using certain radiochemicals by our School of Veterinary Medicine as a part of their program. Thus, the use falls under our education mission.

If you have any questions pertaining to this information, please call me at (608) 262-9178 or FAX me at (608) 262-6767.

Sincerely,

Ronald R. Bresell
Radiation Safety Officer

xc
U.S. Nuclear Regulatory Commission, Region III
Nuclear Materials Licensing Section
801 Warrenville Road
Lisle, Illinois 60532-4351

Safety Department

University of Wisconsin–Madison 30 North Murray Street Madison, Wisconsin 53715-2609
608/262-8769 FAX: 608/262-6767

UNIVERSITY OF
WISCONSIN
MADISON

October 15, 1996

U.S. Nuclear Regulatory Commission, Region III
Nuclear Materials Licensing Section
801 Warrenville Road
Lisle, Illinois 60532-4351

RE: Veterinary Nuclear Medicine Program - BML No. 48-09843-18

The University of Wisconsin, Madison (UW) School of Veterinary Medicine (SVM) has decided to expand their curriculum by entering into the field of veterinary nuclear medicine. The primary reason for this expansion is to insure matriculating veterinary students receive training in all current treatment modalities within the field of veterinary care.

While this endeavor is entirely within the scope of para 9.A. of the UW's byproduct material license which authorizes use "*... for medical research and research and development as defined in 10 CFR Part 30, Section 30.4 including animal studies and student instruction,*" the attachment to this letter will serve to describe the program as implemented.

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Reference

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Ronald R. Bresell

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Radiation Safety Officer
Ronald.Bresell@mail.admin.wisc.edu

Safety Department

University of Wisconsin–Madison 30 North Murray Street Madison, Wisconsin 53715-2609
608/262-8769 FAX: 608/262-6767

JAN 17 1997

Mr. Ron Bresell
Radiation Safety Officer
University of Wisconsin-Madison
Safety Department
30 North Murray Street
Madison, WI 53715

Dear Mr. Bresell:

Enclosed is the NRC license or license amendment which you requested.

You are encouraged to carefully review your license or amendment upon receipt as special conditions may have been added to ensure that the changes requested meet NRC requirements.

Authorization to perform veterinary nuclear medicine studies is granted in Subitems FF. and GG. of Items 6., 7., 8., and 9. In particular, please note that the use of iodine-131 for treatment of hyperthyroidism is limited to felines, as stated in your October 29 and December 19 letters. However, no limitations were placed on use of iodine-131 for diagnostic uses.

Any future correspondence relating to your license should specifically reference your license number to expedite your inquiry.

Should you have any questions regarding your new license or amendment or require clarification, please contact the Nuclear Materials Licensing Branch at (630) 829-9887.

Sincerely,

Original Signed By
Kevin G. Null
Nuclear Materials Licensing Branch

License No. 48-09843-18
Docket No. 030-03465

Enclosures: As stated

DOCUMENT NAME: M:\03003465.CL7

To receive a copy of this document, indicate in the box: "C" = Copy without enclosures "E" = Copy with enclosures "N" = No copy

OFFICE	DNMS/RIII									
NAME	KGNULL:jaw	KN								
DATE	01/16/97									

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PM: 10-29-96

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Veterinary Nuclear Medicine

1. Attached as Appendix A are the CVs for the physicians who will initially implement this program.

   a. Dr. Forrest, a Clinical Assistant Professor of Radiology is also the principal user of the SVM Theratron 78 teletherapy unit and board certified by the American College of Veterinary Radiology in Radiation Oncology.

   b. Dr. Trostle, a Clinical Assistant Professor of Surgery specializes in large animal veterinary medicine.

   Both physicians have had extensive experience in veterinary nuclear medicine before their appointments at the UW. Additionally, Dr. Forrest and Radiation Safety personnel went to the University of Illinois at Urbana-Champaign BML 12-00330-05 (terminated), to discuss pertinent aspects of a viable, long running veterinary nuclear medicine program.

   All workers involved in this program will be trained and monitored as radiation workers as defined in our broad scope license.

2. Veterinary nuclear medicine uses radiopharmaceuticals in ways similar to clinical human nuclear medicine (10 CFR Part 35), the major difference is the administered activity since the patients range in mass from 5 kg to 500 kg. Attached as Appendix B are the protocols.

   The SVM intends to procure unit doses of radiopharmaceuticals either from the UW's Nuclear Medicine Clinic or from an independent radiopharmacy. Syringe shields will be used when applicable and practical. The doses will be administered under the direct supervision of a principle investigator trained in such administration.

   Workload is anticipated to be moderate. Initially the clinic expects to see 2 - 3 patients per week and could ultimately operate a clinic with a caseload of 7 - 12 animals per week.

3. Because these patients are animals, control of potential contamination must be considered. Additionally, the magnitude of the radioactivities involved may warrant exposure concern.

   Conceptually, following administration of radioactive material, patients will be housed in designated area that can contain and/or facilitate disposal of contaminated material and has the appropriate radiation area notifications and controlled access. Each small animal will be tagged with a bright collar bearing the radiation warning

symbol and appropriate warnings. Large animals will have a similar warning tag affixed to their halter. Additionally, the patient's record will be labelled to indicate the patient has received radioactive material and to whom to direct questions.

The maximum exposure rate at 1 meter from the approximate center of the target organ(s) shall be determined immediately after administration of the radiopharmaceutical and shall be entered on the patients chart. When redistribution or significant excretion of the radionuclide is anticipated, the exposure rate shall be remeasured and recorded at appropriate intervals. Exposure rate will be the basis for determination of the length of time which an attendant clinician or student may spend near the patient. Clients/owners will not be allowed to visit patients during the period of confinement.

Contaminated excreta will be processed by half-life decay and final disposal as animal excreta. Certain concerns for specific animal species:

a. Horses - Currently we envision horses to be the only large animal we will treat. Horses will be housed in the large animal holding area. The preferable stall will be the one nearest the imaging area; however, all stalls are similar and the controls implemented will be similar.
   (1) Extra heavy (wood shaving) bedding will be utilized to completely absorb urine. The sex of the horse will determine the possible locations for urination; males in the center of the stall, females around the perimeter. Drains are not located inside the stall, hence the absorption of urine can occur within the stall with no leakage to the environment.
   (2) Until data is collected, dose measurements will be made to determine whether a radiation area exists outside the stall itself. We do not believe this likely since a dose of 150 mCi ^{99m}Tc dose is calculated (Γ = 0.7 R/mCi-hr @ 1 cm; D = 0.07 mR/mCi-hr @ 1 m) to deliver a maximum of 2.6 mR/hr @ 6 feet. Thus, routinely the stall will be well labeled (**Caution - Radioactive Materials**) on all assessable areas. If the stall abuts an outside wall, initially we will measure the exposure rate outside.
   (3) After the patient is released, the stall will be tagged as contaminated along with the date after which the bedding can be handled as non-contaminated by animal care workers.

b. Dogs - Canines are housed in cages which share a common drain at the rear corner of the dog run. We will block access to this drain from the cage housing the dog injected with the radiopharmaceutical.
   (1) Some animals refuse to urinate inside. In these instances, trained animal care workers will accompany the animal to a specially designated and marked (grass/dirt) fenced-in area outside where they may

purge their bladder.

(2) Animals will be tagged as radioactive and only specifically trained individuals will be allowed to assist in the animal's care.

(3) After the patient is released, the cage will be tagged as contaminated along with the date after which it can be hosed down by animal care workers.

c. Cats - Because of their nature, felines are the easiest animal to care for.

(1) Cat litter will be handled as radioactive waste.

(2) Cats will be carried to and from imaging rooms in animal carriers or upon carts.

(2) After the patient is released, the cage will be tagged as contaminated along with the date after which it can be hosed down by animal care workers.

d. Iodinations - Older cats have a relatively high risk for feline hyperthyroidism which responds to a therapeutic (2 - 8 mCi) ^{131}I dose. Considerations in this therapy include:

(1) Only specially trained personnel may be involved.

(2) The cage will be labeled (**Caution - Radioactive Materials**) and the cat will wear a yellow/magenta tape collar and will be housed in relative isolation. The floor in front of the cage will be covered in absorbent paper.

(3) The cat will be monitored daily and the results of this monitoring will be used to determine release.

(4) During the past five years, the UW has performed several feline iodinations. The room in which the animal cage will be housed has good ventilation negating the need for air monitoring. Initially, workers involved in treating and caring for these felines will routinely receive thyroid bioassays. The results of this monitoring may suggest a more routine bioassay program.

When transporting the animal to the imaging area, the shortest route will be taken. Trained animal care workers will survey the route from the area the animal is housed to the imaging area to insure any contamination which occurs will be within defined limits or decontaminated. Decontamination supplies will be available and personnel utilized will be informed of the location of these supplies and decontamination procedures.

4. Radioactive waste will be disposed of according to conditions of the UW's NRC broad scope license.

a. Because of the short half-lives of the radionuclides, the primary mechanism to be employed will be decay-in-storage. As noted above, absorbent material in

the large animal stalls will be allowed to decay a minimum of 10-half-lives and will be monitored (per Reg Guide 10.8) prior to disposal as not radioactive waste.

b. In the event of patient death before release, the body will be handled and disposed under conditions of the UW's license.

5. Release of patients to owners or other clinical wards will follow exposure guidelines found in NUREG-1492, *Regulatory Analysis on Criteria for the Release of Patients Administered Radioactive Material* and DG-8015, *Release of Patients Administered Radioactive Materials* to insure doses to members of the general public are maintained below 100 mrem. Patients may be released when all the following criteria have been met.

a. The total integrated dose that could be accumulated by any individual in close association (1 meter) with the patient for an infinite period of time (D_∞) is less than 100 mrem. This dose can be calculated (equation (7), NUREG-1492):

$$\frac{mR}{hr} = \frac{100\ mR}{1.44 \times T_{eff}}$$

If the effective half-life is unknown (or as a worst case example), then the physical half-life may be used. For our purposes, examples of allowable exposure rates at the time of release for some of the common diagnostic and therapeutic radioisotopes are in the table:

Nuclide	$T_{½}$	Γ/10 (mR/mCi-hr)	mR/hr @ 1 m
^{67}Ga	3.25 day	0.11	0.9
^{99m}Tc	0.25 day	0.07	11.6
^{111}In	2.81 day	0.48	1.0
^{113m}In	0.07 day	0.23	40.4
^{123}I	0.55 day	0.07	5.22
^{131}I	8.04 day	0.22	0.36
^{201}Tl	3.8 day	0.09	0.94

b. A minimum confinement period based on the half-life of the administered radioisotope has been satisfied. These minimum periods will be sufficient to allow at least one half-life period to occur before release and allow for excretion of radioactive urine and feces for those radiopharmaceuticals with a significant rate of excretion. The confinement period for most radioisotopes

shall be:

Half-life	Min Confinement Period
< 12 hr	1 physical half-life
12 - 24 hr	24 hr
> 24 hr	48 hr

c. The owner or agent of the patient shall be provided a detailed written document explaining the hazards and precautions relative to their stewardship of the patient during the period of potential exposure and environmental contamination (10 half-lives). A sample of such documentation is included as Appendix C.

CURRICULUM VITAE

June, 1996

Lisa Jo Forrest

Current Position: Clinical Assistant Professor - Radiology

Office Address: University of Wisconsin - Madison
School of Veterinary Medicine
2015 Linden Drive, West
Madison, WI 53706
(608) 263-5668

BOARD CERTIFICATION

Diplomate, American College of Veterinary Radiology 12/93
Diplomate, American College of Veterinary Radiology (Radiation Oncology) 8/95

PROFESSIONAL EXPERIENCE

University of Wisconsin - Madison
School of Veterinary Medicine
Department of Surgical Sciences
2015 Linden Drive West
Madison, WI 53706
(608) 263-9808
7/1/94 - present

Clinical Assistant Professor, Radiology

University of Wisconsin - Madison
School of Veterinary Medicine
Department of Surgical Sciences
2015 Linden Drive West
Madison, WI 53706
(608) 263-9808
7/1/92 - 7/1/94

Clinical Instructor
Radiology

North Carolina State University
College of Veterinary Medicine
Department of Radiology
Raleigh, NC 27606
(919) 821-9590
7/3/89 - 6/30/92

Resident, Radiology

Cherry Hill Animal Hospital
1425 E. Marlton Pike
Cherry Hill, NJ 08034
(609) 429-4394
6/13/88 - 6/25/89

Staff Veterinarian

Metcalf MR, Forrest LJ, Sellett LC. Scintigraphic Pattern of 99-m-Tc-MDP Uptake in Exercise Induced Proximal Phalangeal Trauma in Horses. Vet Rad, 1990;31:17-21.

Huml RA, Konde LJ, Sellon RK, Forrest LJ. Gastrogastric Intussusception in a Dog. Vet Rad & Us, 1992; 33:150-153.

Forrest LJ. Radiology Corner. Advantages of the Three View Radiographic Examination in Instances Other than Metastasis. Vet Rad & Us, 1992; 33:340-341.

Forrest LJ, Dodge RK, Page RL, Heidner GL, McEntee MC, Novotney CA, Thrall DE. Relationship Between Quantitative Tumor Scintigraphy and Time to Metastasis in Dogs with Osteosarcoma. J Nucl Med 1992;33:1542-1547.

Huml RA, Khoo LH, Stoskopf MK, Forrest LJ. Radiographic Diagnosis. Vet Rad & Ultrasound, 1993; 34:178-180.

Bagley RS, Forrest LJ, Cauzinille L, Hopkins AL, Kornegay JN. Cervical Vertebral Fusion and Concurrent Intervertebral Disc Extrusion in Four Dogs. Vet Rad & Ultrasound, 1993; 34:336-339.

Forrest LJ, Thrall DE. Bone Scintigraphy for Metastasis Detection in Canine Osteosarcoma. Vet Rad & Ultrasound, 1994;35:124-130.

Trostle SS, Forrest LJ, Wilson DG, Brown CE. Osteomyelitis of the lateral malleolus and septic arthritis of the talocrural joint in a bull secondary to *Rhodococcus equi* infection - What's your diagnosis? J Am Vet Med Assoc, 1995;206:11:1695-1696.

Forrest LJ, Thrall DE. Oncologic Applications of Diagnostic Imaging Techniques. Vet Clin North Am (Small Anim Pract) 1995;25(1):185-205.

O'Brien RT, Forrest LJ. A retrospective study of umbilical ultrasound in calves. Vet Radiol & Ultrasound, 1996;37:63-67.

Forrest LJ, Baty CJ, Metcalf MR, Thrall DE. Feline hyperthyroidism: Efficacy of treatment using volumetric analysis for radioiodine dose calculation. Vet Radiol & Ultrasound, 1996;37:141-145.

Hartup BK, Steinberg H, Forrest LJ. Cholangiocarcinoma in a red-tailed hawk (*Buteo jamaicensis*). J Zoo Wild Anim Med, accepted 12/95.

Forrest LJ. Combination cancer treatment: Surgery and radiation therapy. Vet Med, accepted 5/96.

Forrest LJ, Dubielzig RR, MacEwen EG. Peripheral neuroblastoma in a dog. Re-submitted to Vet Radiol Ultrasound 10/9/96.

Carroll GL, Keene BW, Forrest LJ. A brief report: Asystole associated with iohexol myelography. Submitted to Veterinary Radiology and Ultrasound 8/95.

ABSTRACTS

Forrest LJ, Sellet LC, Malone D, Thrall DE. Bone Scintigraphy in Limb Sparing for Osteosarcoma: Prediction of Tumor Response, Allograft Incorporation and Assessment of Metastasis. American College of Veterinary Radiology Meeting, Chicago, IL; November 29 - December 1, 1990.

Forrest LJ, Baty CJ, Malone D, Metcalf MR, Thrall DE. Feline Hyperthyroidism: Nuclear Imaging and Treatment with Radioactive Iodine. American College of Veterinary Radiology Meeting, San Francisco, CA; October 13-17, 1991.

Mahler P, Forrest LJ, Vail DM, MacEwen EG, Kinsella TJ. A Large Animal Model of Radiation Pneumonitis: CT Findings. Radiation Research Society - 42nd annual meeting, Nashville, TN; April 29 - May 4, 1994

Forrest LJ, Mahler PA, Vail DM, Mackie TR, Kinsella TJ. Computed tomographic evaluation of radiation pneumonitis in a canine model. International Veterinary Radiology Association - 10th meeting, Philadelphia, PA; August 1-6, 1994.

Mahler PA, Vail DM, MacEwen EG, Forrest LJ, Kinsella TJ. Possible immunological aspects of radiation pneumonitis: Experimental investigations. American Society for Therapeutic Radiology and Oncology - 36th annual meeting, San Francisco, CA; October 2-6, 1994.

Hartup BK, Steinberg H, Forrest LJ. Cholangiocarcinoma in a red-tailed hawk (*Buteo jamaicensis*). Joint conference of the American Association of Zoo Veterinarians, Wildlife Disease Association and American Association of Wildlife Veterinarians, Lansing, MI; August 12-17, 1995.

Mahler PA, Vail DM, MacEwen EG, Forrest LJ, Kinsella TJ. Computed tomographic evaluation of lung volume and lesions in a canine model of radiation pneumonitis. 10th International Congress of Radiation Research, Wuerstburg, Germany; August 27 - September 1, 1995.

Forrest LJ, Graybush CA. Radiographic patterns of pulmonary metastais in cats. 15th Annual Veterinary Cancer Society meeting, Tucson, AZ; October 21-24, 1995.

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Forrest LJ, Miller PM, Dubielzig RR. Radioprotective effects of topical WR-1065 in the guinea pig model of radiation induced ocular injury. Companion An[illegible] Grant, $8,415.00. Funded.

Webster JG, Will JA, Mackie TR, Forrest LJ. Electrode design for cardiac tachyarrhythmia RF ablation. Resubmitted to NIH, 2/96, total request: $1,040,594.

Forrest LJ, Vail DM, Chun R. Abrogation of radiation induced mucositis with oral administration of an acemannan containing gel in a murine model. Companion Animal Grant, $3,100.00. Funded.

Forrest LJ, Vail DM, Mahler, PA. Veterinary information on-line: Linking Wisconsin veterinarians with the University. Re-submitted to Wisconsin Advanced Telecommunications Foundation 6/14/96, requested amount: $18,780.98.

CONTINUING EDUCATION

Ultrasound for the Nineties for the Small Animal Practitioner.
March 26 & 27, 1993.
Short course for the practitioner. Lectured on "Mass" and "Met" Imaging and instructed in 3 laboratories on ultrasound imaging and biopsy techniques.

Post Graduate Conference.
June 18 & 19, 1993.
Lectured on Radiation Therapy for Veterinary Cancer Patients.

Ultrasound for the Nineties for the Small Animal Practitioner.
July 9 & 10, 1993.
Short course for the practitioner. Lectured on "Mass" and "Met" Imaging and instructed in 3 laboratories on ultrasound imaging and biopsy techniques.

Saturday Enrichment Program.
Developed 45 minute program for 5th - 8th graders as an introduction to Veterinary Medicine. Students were able to develop their own radiograph and to view and discuss numerous radiographs of many different animals.

Ultrasound for the Nineties for the Small Animal Practitioner.
July 15 & 16, 1994.
Short course for the practitioner. Lectured on "Mass" and "Met" Imaging and "Kidney & Bladder Imaging" and instructed in 6 laboratories on ultrasound imaging and biopsy techniques.

Wisconsin Veterinary Medical Association Annual Meeting.
October 14-16, 1994
Gave a 90 minute seminar on Diagnostic Imaging in the Cancer Patient and Radiation Therapy as a Treatment Modality for Cancer Patients.

Feline Echocardiography and Abdominal Ultrasound - Madison, WI.
July 14-15, 1995.
Short course for the practitioner. Lectured on "Kidney and Bladder Imaging" and instructed in two laboratories on ultrasound imaging.

CONTINUING EDUCATION

10th Annual Feline Conference - Madison, WI.
September 16, 1995.
Gave one hour lecture on Feline Ultrasound and participated in afternoon case discussions.

Three hours of Continuing education to the Coulee Veterinary Group in Sparta, WI.
Presented thoracic and abdominal small animal cases to a group of 15 Veterinarians.
November 1, 1995

Large Animal Ultrasound - Madison, WI.
November 10-11, 1995.
Course Coordinator and participated in 3 laboratories.

Wisconsin Veterinary Technician Association - Annual Spring meeting.
Sunday, April 14, 1996.
Gave a 1 hour lecture on "Helpful Hints for Orthopedic Radiography" and a 3 hour wet lab on thorax and abdomen positioning and technique adjustments.

Postgraduate Conference - Madison, WI.
June 14-15, 1996.
Gave 15 minute update on Palliative Radiation for Osteogenic Sarcoma and two 90 minute labs on Pulmonary Patterns: Identification and Interpretation.

Basic Ultrasound for the Small Animal Practitioner - Madison, WI.
June 28-29, 1996.
Will lecture on "Kidney and Bladder Imaging" and "Mass and Met Imaging" and participate in 3 laboratories.

MEETINGS ATTENDED

Computed Tomography Conference
University of Wisconsin, Madison, WI
March 3 & 4, 1993

Tenth Marquette Life Sciences Symposium - Cell Cycle.
Marquette University, Milwaukee, WI
March 12 & 13, 1993

American College of Veterinary Radiology Meeting
Chicago, IL
December 1-5, 1993

International Veterinary Radiology Association - 10th Meeting
Philadelphia, PA
August 1-6 1994

American Society for Therapeutic Radiology and Oncology 36th Annual Meeting.
San Francisco, CA
October 2-6, 1994

MEETINGS ATTENDED

Lisa J. Forrest

American College of Veterinary Radiology - Annual meeting
Honolulu, HI
August 5-11, 1995

15 th Annual Veterinary Cancer Society Meeting.
Tucson, AZ
October 22-24, 1995

Chemoradiation
Chicago, IL
September 28-29, 1995

ASTRO Spring Refresher Course.
Chicago, IL
March 15-16, 1996.

APPLICANTS TRAINING AND EXPERIENCE

TRAINING RECEIVED IN BASIC RADIOISOTOPE HANDLING TECHNIQUES

Dr. Lisa J. Forrest

TOPICS	WHERE TRAINED	DURATION & TYPE[1] OF TRAINING
Principals and practices of radiation protection	University of North Carolina North Carolina State University	60 Hours (C) 53 Hours (C) 3 Years (J)
Biological Effects of radiation	University of North Carolina University of Wisconsin-Madison North Carolina State University	35 Hours (C) 20 Hours (C) 3 Years (J)
Basic calculations for radioactivity measurement and standardization	University of North Carolina North Carolina State University	60 Hours (C) 53 Hours (C) 3 Years (J)
Instrumentation and monitoring techniques	University of North Carolina North Carolina State University	60 Hours (C) 53 Hours (C) 3 Years (J)
Other (describe)		

[1]Please indicate on the job (J) or formal course (C).

EXPERIENCE - Use of radioactive materials, sources, instruments etc.

RADIONUCLIDE	ACTIVITY USED (mCi) avg/max	TYPE OF USE	DURATION OF EXPERIENCE
Technetium	20 mCi / 250 mCi	Diagnostic nuclear imaging in cats, dogs and horses	3 Years
I-131	4 mCi / 5.5 mCi	Thyroid ablation in cats	3 Years

CURRICULUM VITAE

NAME: Steven Scott Trostle **SOCIAL SECURITY NUMBER:** 201-52-9998

DATE OF BIRTH: January 14, 1963 **PLACE OF BIRTH:** York , PA

PRESENT ADDRESS: University of Wisconsin
School of Veterinary Medicine
Department of Surgical Sciences
2015 Linden Dr. West
Madison, WI 53706-1102

TEL: 608-265-3410
FAX: 608-263-7930
E-Mail: trostles@svm.vetmed.wisc.edu

EDUCATION

1991-1994	Residency, Large Animal Surgery School of Veterinary Medicine, University of Wisconsin-Madison, Madison, WI 53706-1102
1987-1990	Doctor of Veterinary Medicine College of Veterinary Medicine University of Tennessee, Knoxville, TN 37901-1071
1984-1986	Master of Science, Animal Science/Reproductive Physiology College of Agriculture Pennsylvania State University, University Park, PA 16801
1980-1984	Bachelor of Science, Animal Husbandry Delaware Valley College of Science and Agriculture Doylestown, PA 18901

SPECIALTY BOARDS

1996	Diplomate American College of Veterinary Surgeons

PROFESSIONAL EXPERIENCE

7/96 - *Present*	Clinical Assistant Professor - Department of Surgery, Large Animal Surgery Section School of Veterinary Medicine, University of Wisconsin, Madison, WI.
9/95 - 6/96	Clinical Instructor - Department of Surgery, Large Animal Surgery Section School of Veterinary Medicine, University of Wisconsin, Madison, WI.
8/94-8/95	Clinical Instructor - Equine Surgery and Nuclear Medicine Marion duPont Scott Equine Medical Center, Leesburg, VA
7/91-6/94	Resident, Department of Surgical Sciences, Large Animal Surgery Section School of Veterinary Medicine, University of Wisconsin, Madison, WI.
6/90-6/91	Associate Veterinarian Town and Country Animal Hospital, Centreville, MD

PROFESSIONAL AFFILIATIONS

1996 American College of Veterinary Surgeons
1990 American Veterinary Medical Association
1990 American Association of Equine Practitioners
1990 Pennsylvania State Veterinary Medical Association

LICENSURE

1994 California
1992 Wisconsin
1990 Maryland
1990 Pennsylvania
1990 Virginia

HONORS AND AWARDS

1995 ACVS Outstanding Research Paper
1990 American College of Veterinary Surgeons Award, University of Tennessee
1990 Upjohn Large Animal Medicine and Surgery Award, University of Tennessee
1990 Hal and Bel Reagan Large Animal Scholarship, University of Tennessee
1988 Outstanding College Students In America, University of Tennessee
1988 Who's Who of Students in Medicine, University of Tennessee
1984 Who's Who Among American Colleges and Universities, Delaware Valley College
1984 Delta Tau Alpha Outstanding Senior, Delaware Valley College
1983 Delta Tau Alpha Agriculture Honor Society, Delaware Valley College
1983 Deep Run Packing Scholarship, Delaware Valley College
1982 American Society of Animal Scientist Undergraduate Scholarship, Delaware Valley College
1981 Block and Bridle Scholarship, Delaware Valley College

REFEREED PUBLICATIONS

Trostle SS, Hendrickson DA, Stone WC, Klohnen AAO. Use of antimicrobial-impregnated polymethyl methacrylate in the treatment of chronic refractory septic arthritis and osteomyelitis of the digit in a bull. *J Am Vet Med Assoc* 1996;208:404-407.

Trostle SS, Hendrickson DA. Suture sinus formation as an incisional complication following abdominal wall closure using polypropylene in horses. *J Am Vet Med Assoc* 1995; 207:742-745.

Trostle SS, Semrad SD, Hendrickson DA. Tracheal perforation in the horse. *Comp Contin Educ Pract Vet* 1995;17:952-959.

Trostle SS, Wilson DG, Hanson PD, Brown CE. Management of a radius fracture in an adult bull. *J Am Vet Med Assoc* 1995; 206:1917-1919.

Trostle SS, Wilson DG, Forrest LJ, Brown CE. What's your diagnosis? *Rhodococcus equi* septic arthritis, osteomyelitis in a bull. *J Am Vet Med Assoc* 1995; 206:1695-1696.

REFEREED PUBLICATIONS

Trostle SS, Wilson DG, Dueland RT, Markel MD. In vitro biomechanical comparison of solid and tubular interlocking nails in neonatal bovine femora. *Vet Surg* 1995;24::235-243

Trostle SS, Wilson DG, Stone WC, Markel MD. A study of the biomechanical properties of the adult equine linea alba: Relationship of tissue bite size and suture material to breaking strength. *Vet Surg* 1994;23:435-441.

Stone WC, Trostle SS, Gerros TC. The use of a primary muscle pedicle flap to repair a caudal thoracic wound in a horse. *J Am Vet Med Assoc* 1994;205: 828-833.

Trostle SS, Rosin E. Selection of prosthetic mesh implants. *Comp Contin Educ Pract Vet* 1994;16:1147-1158.

Trostle SS, Dubielzig RR, Beck KA. Examination of frozen cross sections of cervical spinal intersegments in nine horses with cervical vertebral malformation: Lesions associated with spinal cord compression. *J Vet Diagn Invest* 1993;5:423-431.

Trostle SS and Markel MD. Incarceration of the large colon in the gastrosplenic ligament of a horse. *J Am Vet Med Assoc* 1993;202:773-775.

Trostle SS, Wilson DG, Steinberg HH, Dzata G, Dubielzig RR. Antemortem diagnosis and attempted treatment of *(Halicephalobus) Micronema deletrix* in a horse. *Can Vet J* 1993;34:117-118.

Trostle SS, The effects of postpartum status and GnRH in suckled beef cows treated with norgestomet and prostaglandin. *Thesis. 1986*

PUBLICATIONS - SUBMITTED/ IN PREPARATION

Trostle SS, White NA, Donaldson LD, Freeman LJ, Hendrickson DA. Laparoscopic colopexy in the horse. *Equine Vet J* 1996

Goodrich L, Trostle SS. What's your diagnosis? Long collateral ligament avulsion of the tarsus in a horse. *J Am Vet Med Assoc* 1996

Lopez, MJ, Nordberg C, Trostle SS. Caudal cervical fracture presenting as a radial nerve paralysis in a horse. *Can Vet J* 1996

Klohnen A, Trostle SS, Stone WC, Johanningmeier D, Wilson DG, Hendrickson DA. Management of a pathological fracture of the distal phalanx in a horse. *Can Vet J* 1996

Stone WC, Bjorling DE, Trostle SS, Hanson PD, Markel MD. Prepubic urethrostomy in small ruminants for urethral obstruction: Clinical description in sheep and goats. *J Am Vet Med Assoc* 1996

Murray MD, Cavey MD, Feldman BF , Trostle SS, White NA. Signs of sympathetic dnervation associated with a thoracic melanoma in a horse. *J Vet Int Med* 1996

Donaldson LD, Trostle SS, White NA, The effects of abdominal insufflation with 15 mm Hg of carbon dioxide on cardiopulmonary measurements in dorsally recumbent halothane anesthetized horses. *Vet Surg* 1996

Trostle SS, O'Brien RO, Stone WC. Diagnostic imaging of the bovine mammary gland. *Comp Contin Educ Pract Vet*

BOOK CHAPTERS

Trostle SS, Markel MD. Advances in Ruminant Orthopedics. Fracture Biology, Biomechanics and Internal Fixation. *Vet Clin North AM [Food Anim Pract]*, 1996;12 :19-46

Trostle SS, Markel MD. Advances in Ruminant Orthopedics. Fractures of the Femur. *Vet Clin North AM [Food Anim Pract]*, 1996;12:169-180.

BOOK CHAPTERS - SUBMITTED/IN PREPARATION

Trostle SS. Laparoscopy and laparoscopic procedures of the large animal abdominal cavity. In: *Veterinary Endo-Surgery*, Freeman LJ ed 1997

Trostle SS, Hartman FA. Surgical infection In: *Equine Surgery*, Auer JA ed. 1997

NON-REFERRED PUBLICATIONS

Trostle SS. Nuclear Scintigraphy in the diagnosis of lameness in Thoroughbreds. *The Thoroughbred Owner* July 1995;14-15.

PROCEEDINGS/ABSTRACTS

Trostle SS, White NA, Donaldson LA, Freeman L, Hendrickson DA. Laparoscopic colopexy in a horse *Vet Surg* 1996;25:438.

Donaldson LD, Trostle SS, White NA. Cardiopulmonary changes during laparoscopic colopexy in dorsally recumbent horses anestnesized with halothane in oxygen. *Vet Surg* 1996;25:181.

Trostle SS, Wilson DG, Stone WC, Markel MD. Biomechanical study of suture pullout in the adult equine linea alba. *Vet Surg* 1993;22:403.

Trostle SS, Wilson DG, Dueland TA, Markel MD. A biomechanical study of solid and tubular interlocking nails in bovine femora. *Vet Surg* 1993:22:403.

Trostle SS, Cash EH, Griel LC, O'Connor MC, and Deaver DR. The effects of postpartum status and GnRH on pregnancy rates in suckled beef cows. 1986 *J Anim Sci, 63 (Suppl I):327.*

Trostle SS, Deaver DR, and Tanabe TY. The effects of frequent bleeding on estrous cycle length, duration of estrus and fertilization rates in dairy cattle. 1986 *J Anim Sci, 63 (Suppl I,:149.*

RESIDENT TRAINING

1996 - *present*	Donna Shetko, DVM
1995 - *present*	Mandi Lopez, DVM
1995-1996	Andreas Klohnen, DVM
1994-1995	Patricia Doyle, DVM
1994-1995	Laurie Goodrich, DVM, MS
1994-1995	Kelly Farnsworth, DVM

APPOINTMENTS

School of Veterinary Medicine

1996	Equity Action Commitee
1996	Search committee for third shift Veterinary Technician in the Large Animal Clinic
1995 - present	Nuclear Medicine Development Committee

Department of Surgical Sciences

1996	Search Committee - Anesthesia Staff Veterinarian
1996	Search Committee - Large Animal Surgery

COURSES TAUGHT

1996- *present*	938-746 Food Animal Surgery Didactic Laboratory, Co-coordinator School of Veterinary Medicine, University of Wisconsin-Madison, Madison, WI
1996- *present*	938-631 Large Animal Surgery. (8 lectures\year) School of Veterinary Medicine, University of Wisconsin-Madison, Madison, WI
1991-*present*	938-633 Large Animal Surgery Laboratory. (4 labs\year) School of Veterinary Medicine, University of Wisconsin-Madison, Madison, WI
1995-*present*	938-747 Equine Lameness Didactic Laboratory, (1 lecture\year) School of Veterinary Medicine, University of Wisconsin-Madison, Madison, WI
1995-*present*	938-642 Large Animal Surgery Clinical Rotation (30 weeks\year) School of Veterinary Medicine, University of Wisconsin-Madison, Madison, WI
1994-1995	VM9544 Equine Medical Center, Surgical Service (44 weeks of clinical service) Marion duPont Scott Equine Medical Center Leesburg, VA
1986	492 Beef Production, Reproductive Management of the Beef Herd Lecture (4 lectures/4 labs) Penn State University, University Park, PA
1985-1986	490 Advanced Reproductive Physiology Laboratory, (10 labs\year) Penn State University, University Park, PA
1984-1986	324 Livestock Performance and Evaluation, (30 labs\year) Penn State University, University Park, PA

PRESENTATIONS

Scientific Meetings

11/3/96 Laparoscopic colopexy in the horse.
American College of Veterinary Surgeons. San Francisco, CA

10/26/93 A biomechanical study of suture pullout in the adult equine linea alba.
American College of Veterinary Surgeons. San Francisco, CA

10/26/93 A biomechanical study of solid and tubular interlocking nails in bovine femora.
American College of Veterinary Surgeons. San Francisco, CA

08/01/86 The effects of postpartum status and GnRH on pregnancy rates in suckled beef cows.
National Meeting American Society of Animal Scientists. Manhatten, KS

07/08/86 The effects of frequent bleeding on estrous cycle length, duration of estrus and fertilization rates in dairy cattle. Northeast Regional Meeting American Society of Animal Scientists, Providence, RI

Faculty Seminars

2/4/95 The use of once daily dosing of aminogylcosides
Marion duPont Scott Equine Medical Center, Leesburg, VA

PRESENTATIONS

Continuing Education

11/15-16/96 Large Animal Ultrasound Shortcourse
University of Wisconsin School of Veterinary Medicine, Madison, WI

10/18/96 Treating the Valuable Neonatal Calf
Wisconsin Veterinary Medical Association Meeting, Madison, WI

2/24/95 Preventing and Treating Trailer Injuries and Trauma
The United States Trail Ride, Inc., Trailer Safety Clinic, Leesburg, VA

10/8/94 Nuclear Medicine in Horses
Marion duPont Scott Equine Medical Center Open House, Leesburg, VA

04/27/93 Preparing Your Horse for a Pack Trip
Dane County Equestrian Club, Madison, WI

03/09/93 Use of Prosthetic Mesh Implants In General Surgery
Greater Rockford Veterinary Medical Association, Rockford, IL

06/19/92 Typhlectomy in the Bovine
Postgraduate Conference, Madison, WI

04/05/92 Management of Crooked Legs in Foals.
Midwest Horse Fair. Madison, WI.

Continuing Education

09/29/91 Normal Equine Confirmation.
5th Annual Fall Horseman's Conference, University of Wisconsin-Madison.

Instructional Videotapes

11/06/92 Instructional Videotape: Scrubbing, Gowning and Gloving
University of Wisconsin-Madison, School of Veterinary Medicine

Instructional Audiotapes

07/95 Trostle SS, Semrad SD, Hendrickson DA. Tracheal perforation in the horse. *Comp Contin Educ Pract Vet*

Instructional Teleconferences

01/30/92 Management of Crooked Legs in Foals.
Educational Teleconference Network, University of Wisconsin Extension Service.

GRANTS

In vivo comparison between solid interlocking nails and intramedullary pins in oblique, mid diaphyseal femoral osteotomies in calves. Trostle SS, Wilson DG. School of Veterinary Medicine, University of Wisconsin-Madison, Food Animal Fund $9600.

Evaluation of COSEQUIN in induced arthritic disease of the horse: A pilot study. White NA, Furr MO, Trostle SS. Nutramax Laboratories, Inc. $8,000

Laparoscopic colopexy for the techniques for the prevention and treatment of large colon displacement and volvulus in the horse. Trostle SS, White NA, Hendrickson DA, Clem MF, Freeman LJ. Virginia-Maryland Regional College of Veterinary Medicine, Clinical Initiative Grant, $5030 & Ethicon Endosurgery $8,000.

The effects of abdominal insufflation with 15 mm Hg of carbon dioxide on cardiopulmonary measurements in dorsally recumbent halothane anesthetized horses. Trostle SS, Donaldson LD, White NA, Hendrickson DA. Virginia-Maryland Regional College of Veterinary Medicine, Clinical Initiative Grant, $5030.

A biomechanical study of solid and tubular interlocking nails in bovine femora. Dueland TA, Wilson DG, Trostle SS. School of Veterinary Medicine, University of Wisconsin-Madison, Food Animal Fund $14,480

Biomechanical study of suture pullout in the adult equine linea alba. Wilson DG, Stone WC, Trostle SS. School of Veterinary Medicine, University of Wisconsin-Madison, Companion Animal Fund $5,450

MEETINGS ATTENDED

11/96 31st Annual Meeting, American College of Veterinary Surgeons, San Francsico, CA

10/95 30th Annual Meeting, American College of Veterinary Surgeons,Chicago, IL

10/94 29th Annual Meeting, American College of Veterinary Surgeons, Washington, DC

9/94 Equine Nuclear Medicine Workshop, University of Illinois, Champaign, IL

7/94 Society of American Gastrointestinal Endoscopic Surgeons, Endoscopy and Laparoscopy Workshop for Residents, Ethicon, Endosurgery, Cincinnati, OH

10/93 28th Annual Meeting, American College of Veterinary Surgeons, San Francisco, CA

03/93 6th Annual Meeting, Advanced Course Surgical Fixation of Fractures and Non-Unions, Equine Section, Columbus, OH

03/92 23rd Annual Meeting, Basic Course Surgical Fixation of Fractures and Non-Unions, Equine Section, Columbus, OH

APPLICANTS TRAINING AND EXPERIENCE

Complete a separate sheet for each applicant (make copies if necessary).

Dr. Steve Trostle

TRAINING RECEIVED IN BASIC RADIOISOTOPE HANDLING TECHNIQUES

TOPICS	WHERE TRAINED	DURATION & TYPE[1] OF TRAINING
Principles and practices of radiation protection	Equine Nuclear Medicine Workshop VA-MD Regional College of Veterinary Medicine	3 days (C) 1 year (J)
Biological effects of radiation	Equine Nuclear Medicine Workshop VA-MD Regional College of Veterinary Medicine	3 days (C) 1 year (J)
Basic calculations for radioactivity measurement and standardization.	Equine Nuclear Medicine Workshop VA-MD Regional College of Veterinary Medicine	3 days (C) 1 year (J)
Instrumentation and monitoring techniques.	Equine Nuclear Medicine Workshop VA-MD Regional College of Veterinary Medicine	3 days (C) 1 year (J)
Other (describe) -		

[1]Please indicate on the job (J) or formal course (C).

EXPERIENCE - Use radioactive materials, sources, instruments etc

RADIONUCLIDE	ACTIVITY USED (mCi)		TYPE OF USE	DURATION OF EXPERIENCE
	avg	max		
Technectium	200	12,000	Diagnostic nuclear medicine evaluation of lameness in horses	VA-MD Regional College of Veterinary Medicine 1 year

NUCLEAR MEDICINE PROTOCOLS - SVM

ADRENAL IMAGING:

RADIOPHARMACEUTICAL:

CHOICE:

ADRENAL CORTEX:

Originally **I-131-19-iodocholesterol**, replaced by:

NP-59 I-131-6ß-iodomethyl-19-norcholesterol

SMC, SCINTADREN S3-75-6ß-seleromethyl-19-norcholesterol

ADRENAL MEDULLA:

I-131-MIBG OR **I-123-MIBG**

SCANNING PROTOCOL:

RADIOCHOLESTEROL IMAGING:

1mCi (37 MBq) per 1.7 m^2

Image 5-7 days post injection if non-dexamethasone suppression
3-5 days if dex. suppression.

Image for 20 minutes or 100 kcts.

ADRENAL MEDULLAR IMAGING:

5 mCi (185 MBq) I-123-MIBG for a 10 pound dog.

Image at 4, 18 and 24 hours for 300 kcts.

BONE SCINTIGRAPHY:

RADIOPHARMACEUTICAL: ^{99m}Tc-Methylene diphosphonate (^{99m}Tc-MDP)

Route: Intravenous (IV)

SCANNING PROTOCOL:

Equine Dose: 80-130 mCi
Dog Dose: 5 - 20 mCi
Cat Dose: 5 - 10 mCi

Three Phase Bone Scan:

1. Initial dynamic flow study of area of interest, with rapid sequential images ever 2-3 sec. for 30 sec.
2. Blood pool image at 5 min.
3. Delayed bone images at 2-4 hours.

BRAIN SCINTIGRAPHY:

RADIOPHARMACEUTICAL:

^{99m}Tc-GHA (glucoheptonate), ^{99m}Tc- DTPA, TcO_4^- (pre-treat with perchlorate)

Route: IV

SCANNING PROTOCOL:

CANINE DOSE: 5 - 20 mCi

Scan at least 2 hours (preferable 4-6 hrs.) post injection.

CARDIAC SCINTIGRAPHY:

RADIOPHARMACEUTICAL:

CHOICE: Blood Pool Agents

TcO4-:	First pass - most commonly used
Tc-DTPA:	First pass studies - if rapid clearance desired
Tc-GH:	First pass studies - if rapid clearance desired
Tc-MAA:	First pass studies - quantify RT - LT shunts
Tc-RBC:	Gated studies
Tc-HSA:	Gated studies

SCANNING PROTOCOL:

GATED STUDIES:

DOSE: Cat: 5 mCi
Dog: 15-20 mCi
Horse: 50-75 mCi

FIRST PASS:

DOSE: Cat: 5 mCi
Dog: 5-20 mCi
2-5 mCi for Tc-MAA
Horse: 20-100 mCi

GASTROINTESTINAL SCINTIGRAPHY:

RADIOPHARMACEUTICAL:

CHOICE:

SOLID PHASE GE: Tc-SC + chicken liver, egg, baby food
Resin beads
Tc-DISIDA

GI BLEEDS: Tc labeled RBC

ESOPHAGEAL MOTILITY: Tc-SC
TcO4

GE REFLUX: Tc-SC

GASTRIC SECRETORY FUNCTION: TcO4

INFECTION/INFLAMMATORY: Tc-phosphates
Tc-leukocytes
In-WBC
Gallium-67

SCANNING PROTOCOL:

ESOPHAGEAL MOTILITY:

Tc-SC or TcO4 --- per os
Dynamic series of 0.5 second images over 10-20 seconds.
Repeated swallows induced until esophagus clears.

GI REFLUX:

50-100 uCi Tc-SC --- per os or via stomach tube
Position animal with cranial abdomen/caudal thorax over camera
Ventral images - best definition of GE junction
Dynamic images for 20-60 minutes.

ROI --- stomach & esophagus
A small amount of reflux within the first 6 minutes is normal.
Good screening test

GASTRIC EMPTYING:

Solid phase -- Tc-SC or **Tc-DISIDA**
Mix with baby food and kibble, feed after 18 hour fast.
Allow 15 minutes for meal consumption
Immediately acquire 30 second images
left lateral
right lateral
ventral
Repeat above every 30 minutes
ROI --- stomach (avoid bowel)
DECAY CORRECT COUNTS
Calculate emptying t1/2

ESOPHAGEAL MOTILITY:

Tc-SC or **TcO4** --- per os
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ROI - esophagus ---- % clearance and transit times.

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ventral
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ROI --- stomach (avoid bowel)
DECAY CORRECT COUNTS
Calculate emptying t1/2

INFECTION SCANNING:

RADIOPHARMACEUTICAL:

CHOICE:
Tc-MDP - osteomyelitis (three phase)
Gallium-67-citrate
^{111}In-WBC
^{111}In-Chloride
Tc-HMPAO-WBC

SCANNING PROTOCOL:

Gallium-67-citrate:
6 mCi of gallium IV
Scan 6-72 hours later.
Medium Energy collimator
Multichannel analyzer permits imaging of several Ga gamma peaks. Single channel analyzer - wider window over **93 & 184 keV** peak
Early images for inflammation, later images for tumor.
300 - 500 kcts.
Increased specificity with SPECT

^{111}In-WBC:
Labeling: 2 steps, cell separation & incubation with radioactive tag.
Dose - 0.5 - 1 mCi
Image 18-24 hours later
Medium Energy collimator, 15% window at 173 & 247 photopeak

In-111-Chloride:
Dose - 0.75-1 mCi
Image at 24 and 72 hours
Medium Energy collimator, 15% window at 173 & 247 photopeak

Tc-HMPAO-WBC:
Lipophilic agent diffuses through the cell membrane at room temperature and binds intracellularly.

LIVER / SPLEEN SCANNING: (RADIOCOLLOID SCANNING)

RADIOPHARMACEUTICAL:

Tc-99m sulfur colloid

SCANNING PROTOCOL:

DOSE: 2 - 6 mCi of Tc-sulfur colloid, depending on the body weight.
Static images - 20 minutes later.

PORTAL SCINTIGRAPHY:

RADIOPHARMACEUTICAL:

CHOICE:

Inert RP:

TcO4

SCANNING PROTOCOL:

TcO4:

12 hour fast, enema at least 2 hours prior to study.
Right lateral recumbancy
12 French catheter with 3-way stop-cock inserted 15-20 cm into colon.
5-20 mCi of TcO4 in 1.5 ml saline, bolus follow with air flush

HEPATOBILIARY IMAGING:

RADIOPHARMACEUTICAL:

CHOICE:

Tc-DISIDA

SCANNING PROTOCOL:

University of Tennessee protocol: small animal
DOSE: **3 - 6 mCi - Tc-DISIDA** - IV bolus
Feed patient 4 - 6 hours prior to scan

LUNG SCANNING:

RADIOPHARMACEUTICAL:

CHOICE:

Tc-MAA - PERFUSION
Tc-DTPA - VENTILATION

SCANNING PROTOCOL:

PERFUSION:

DOSE:

EQUINE: 30 mCi.
DOG: 3-5 mCi.

VENTILATION:

DOSE:

40-60 mCi in an acorn nubulizer in a volume of 4 ml.

LYMPHOSCINTIGRAPHY

RADIOPHARMACEUTICAL:

CHOICE:

99mTc-antimony sulphide colloid - 100-500 uCi

SCANNING PROTOCOL:

0.5 mCi (18.5MBq) injected in webbing between toes.
99mTc-antimony sulfide colloid - images 2 hrs. post injection.

RENAL SCINTIGRAPHY:

RADIOPHARMACEUTICAL:

A) **CHOICE:**

Tc-DTPA: Completely eliminated by glomerular filtration, NO tubular secretion. MEASURES GFR. GLOBAL RENAL FUNCTION

I-131-OIH (hippuran): Tubular secretion. MEASURES RENAL PLASMA FLOW (ERPF). 80% tubular secretion, 20% glomerular filtration.

Tc-MAG3: Tubular secretion. Distal tubules.

Tc-DMSA: CORTICAL IMAGING AGENT. 50% of the dose accumulates in the cortical tubules within 1 hour and remains in the cortex up to 24 hours. Renal uptake, retention by proximal tubules with less than 5% being excreted.

SCANNING PROTOCOL:

Tc-DTPA DOSE: 2-3 mCi
Give rapid IV bolus (cephalic), scan immediately.

THYROID IMAGING:

RADIOPHARMACEUTICAL:

CHOICE:

TcO_4^-

^{131}I (sodium iodine)

SCANNING PROTOCOL:

DOSE: TcO_4^-

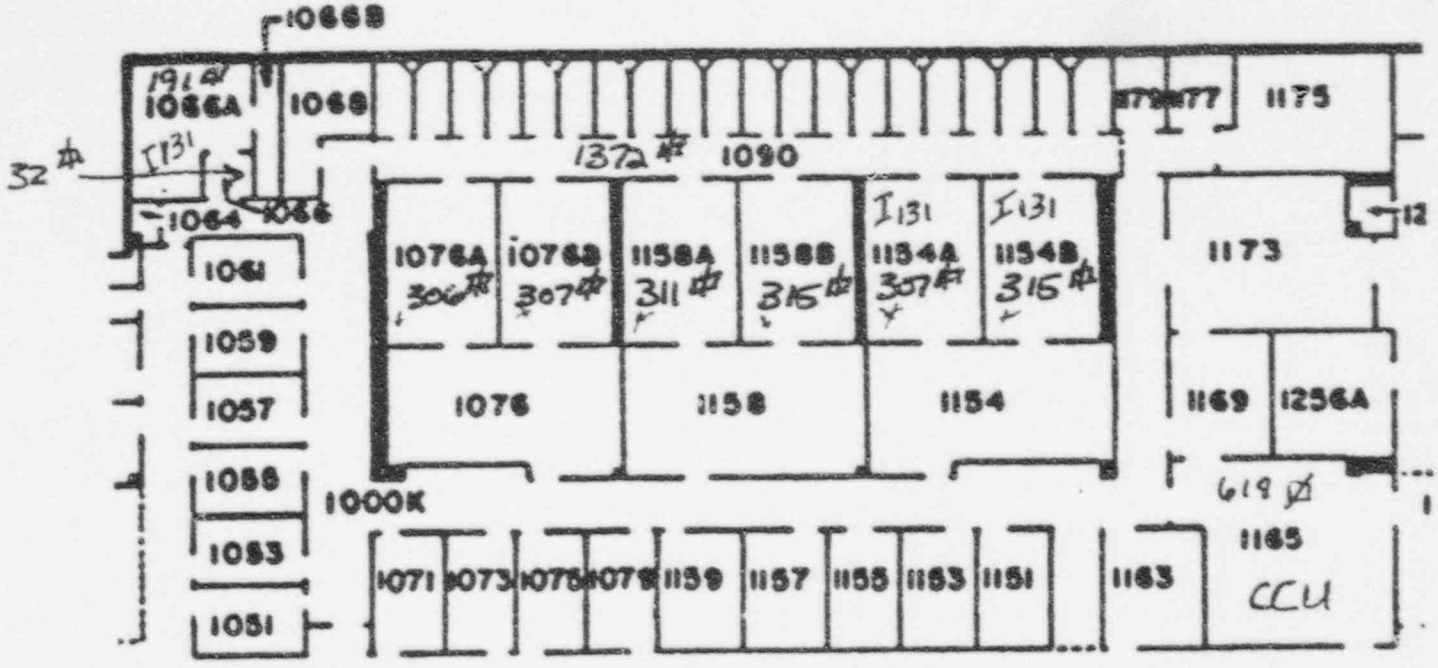
HORSE: 10 mCi
DOG/CAT: 1-3 mCi
Time to scan - 20 minutes.

^{131}I

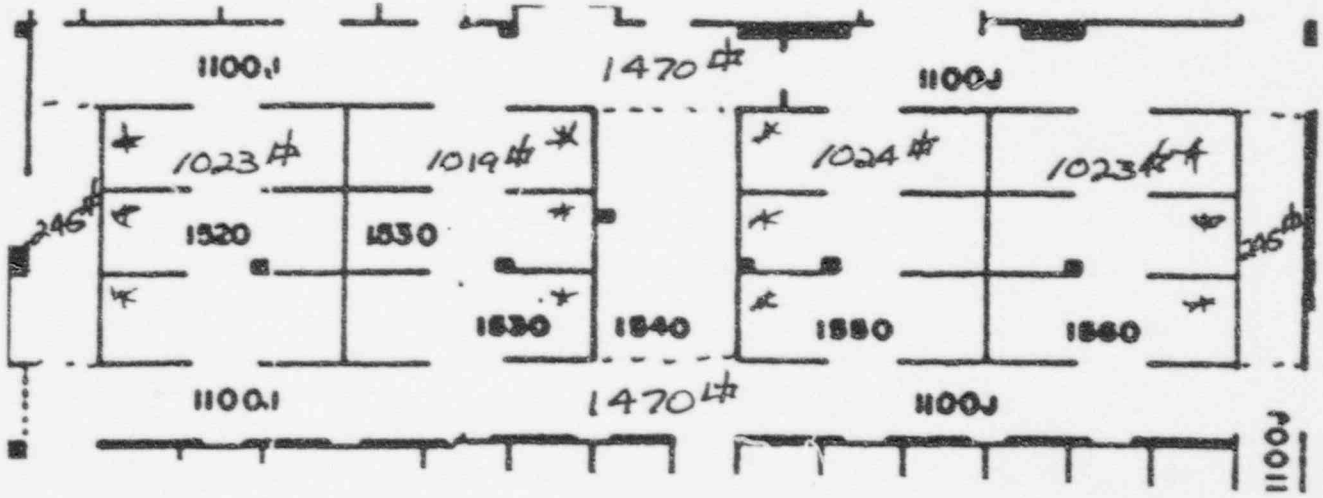
DOG/CAT: 500 uCi
Time to scan - 24 hours.

THERAPUETIC THYROID ABLATION:

Feline hyperthyroidism. Dose of I-131: 2-8 mCi



small animal areas (dog/cat)

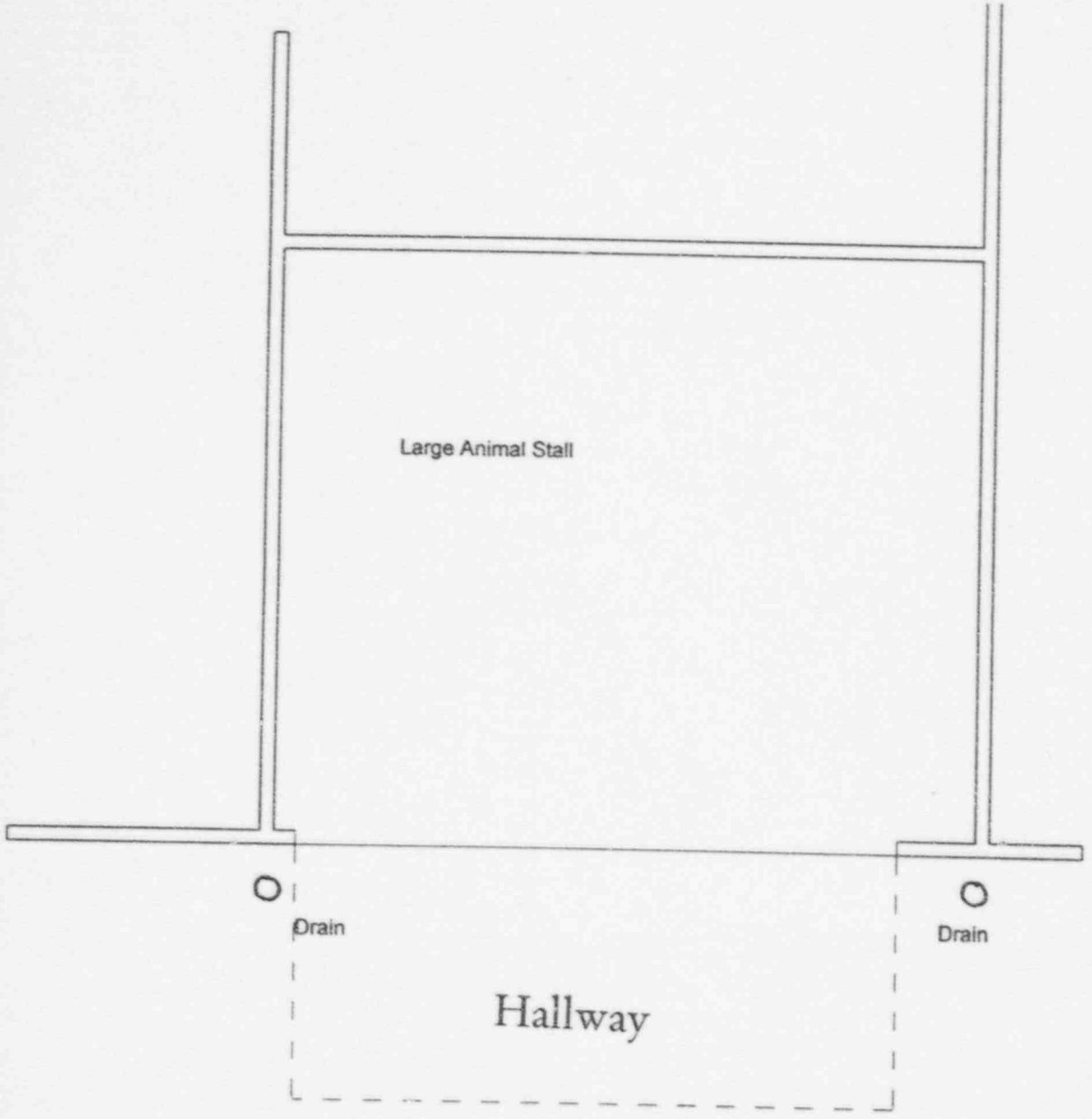


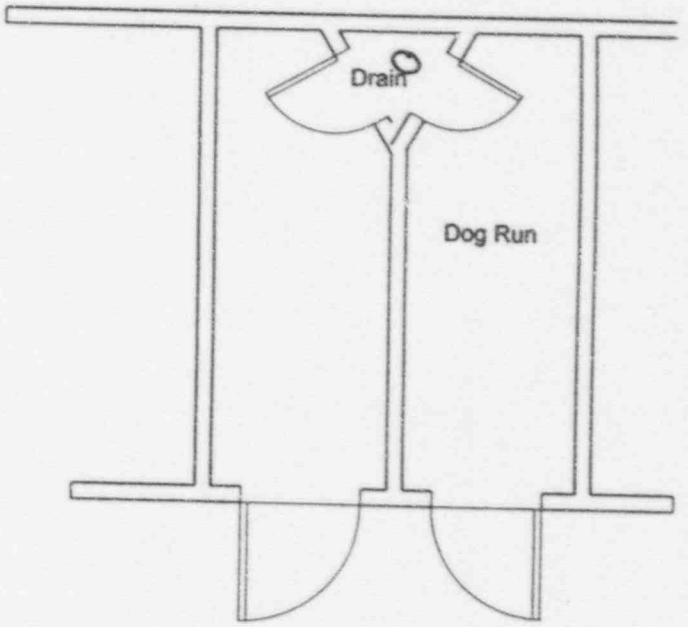
Equine Stalls

NOT TO SCALE

□ = SQUARE FEET

Diagram -- Animal Holding Areas





Hallway

OWNER GUIDE TO RADIOIODINE TREATMENT FOR FELINE HYPERTHYROIDISM

The thyroid gland is a small gland located in the neck, which plays an important role in controlling the body's metabolism. It produces thyroid hormones which travel throughout the body. Hyperthyroidism is a result of the thyroid gland releasing too much thyroid hormone. This can cause a variety of symptoms including hyperactivity and nervousness, weight loss, increased appetite, vomiting and poor hair coat.

Hyperthyroidism can be treated in three ways: 1) Surgical excision of the thyroid gland, 2) medical management with antithyroid drugs, and 3) radioiodine therapy. Definitive treatment for hyperthyroidism involves elimination of the hyperfunctioning gland, so that overproduction of thyroid hormone will cease. This can be accomplished by either surgery or radioiodine therapy.

Radioiodine is taken up by the thyroid gland and destroys some of the cells. This reduces the size of the gland and brings the thyroid hormone production back to normal levels.

Your pet will need to stay hospitalized for 1-2 weeks after administration of radioiodine to ensure that there is no unnecessary exposure to radioactivity. After your pet is released to you, you must still take precautions for the next 3-4 weeks. These include:

- Keep you pet strictly confined to your premises during this period. Do not allow your pet to roam freely in the neighborhood.
- Stay 3 feet or further away from your pet, except for brief periods for necessary care. Radiation exposure decreases rapidly with distance.
- Children under the age of 18 and pregnant women should not have any prolonged, close contact with your pet.
- For the first week, minimize close contact with your pet, including arranging to have your pet sleep in a separate room.
- Your pet is still excreting low levels of radioactive iodine. For cats, make sure that your pet uses the litter pan and change the litter daily. Use plastic disposable litter pan liners to minimize handling of litter. For dogs, your pet must not leave your property during the restricted period.
- Wash your hands carefully after handling your pet, its food dishes or litter pan.

If your pet should die or need veterinary attention prior to _____, notify your veterinarian at the School of Veterinary Medicine or Drs. Forrest, Vail or Henik at 608-263-7600.

I have read and understand the radiation safety precautions necessary if my pet is treated with radioiodine and agree to follow them carefully. I request that my animal be treated with radioiodine.

_____ _____

Owner Signature Date

OWNER GUIDE TO DIAGNOSTIC NUCLEAR IMAGING IN COMPANION ANIMALS

Nuclear medicine *(scintigraphy)* is an imaging technique that involves the administration of small quantities of a radioactive material *(radiopharmaceutical)* to the patient. Following administration of the radiopharmaceutical, the radioactivity is distributed throughout the body and localized in different body systems depending on the specific pharmaceutical used. An external detector *(gamma camera)* is then used to create images of the distribution of the radiopharmaceutical and thus provide images that reflect various physiological processes.

The amount of the radiopharmaceutical that is administered is relatively small and produces radiation doses to the patient that are comparable to some of the special procedures used in conventional diagnostic radiography. However, since the radiation is administered to the patient, the patient and the patient's waste (feces and urine) become a source of radioactivity for a short period of time. Because of this potential for exposure to others, care must be exercised in handling nuclear medicine patients so as to minimize the exposure to others. This is done by taking special precautions in handling the patient and by limiting access to the patient for a period of time.

The radiopharmaceuticals used have a very short half-life of only 6 hours. This means that every 6 hours, one-half of the previous radioactivity has decayed. All radioactive decay essentially stops at 10 half-lives or 60 hours. During that 60 hour time period the area (stall/cage) will be identified with a radioactive label or sign to inform personnel in the area. In general, patients will be confined to the UW-VMTH until exposure rate at 1 meter decreases to a level of 2 mR/hr, a safety level determined by the nuclear Regulatory Commission (NRC). Generally this will take approximately 24 hours. During this 24 hour period, owner visitation is not allowed and handling of the animals is minimized and only performed by individuals trained in radiation safety.

After the patient reaches the 2 mR/hr at 1 meter exposure level, they are free to move within the hospital for other diagnostic procedures or be discharged to the owner. No special precautions need to be taken at this time since the radiation level is essentially considered to be at background or below. As an additional precautionary measure to personnel in the hospital, animal waste (feces and urine) will be isolated until the 60 hour period has passed.

I have read and understand the information above and agree to abide by the safety practices described.

_____ _____

Owner/Agent Date

UNIVERSITY OF
WISCONSIN
MADISON

December 19, 1996

U.S. Nuclear Regulatory Commission, Region III
ATTN: Kevin Null
Nuclear Materials Licensing Section
801 Warrenville Road
Lisle, Illinois 60532-4351

RE: Veterinary Nuclear Medicine Program- BML No. **48-09843-18**, Control # **301978**

Reference

1. UW letters dated 15 October and 29 October, 1996 Subject: Veterinary Nuclear Medicine Program - BML No. **48-09843-18**

2. Phone conversation between Kevin Null, NRC Region III and myself requesting additional information on this amendment request.

The University of Wisconsin, Madison (UW) School of Veterinary Medicine (SVM) has decided to expand their curriculum by entering into the field of veterinary nuclear medicine. Specific items of additional information include:

1. Criteria used by the University Radiation Safety Committee in approving users.
   a. Users will be board certified veterinary doctors. While most will be American Board certified, some veterinary medicine physicians matriculated into either a residency or fellowship program may be board certified by their country of origin (e.g., Canada, Great Britain, Australia, etc.).
   b. Training and experience of users will, at a minimum, comply with 10 CFR 33.15(2) which specifies 40 hours in the safe handling of radioactive materials, characteristics of ionizing radiation, units of radiation dose and quantities, radiation detection instrumentation, biological hazards of exposure to radiation.
   c. Additional training and experience for ^{131}I therapies (in cats) will require users to have "supervised clinical experience under the supervision of an authorized user that includes the use of iodine-131 for" therapy in 3 patients (10 CFR 35.934(b)).

   Training and experience will be documented and records maintained for at least three years after an authorized user departs.

2. The street address for the School of Veterinary Medicine is: 2015 Linden Drive. The building is on the contiguous campus of the UW-Madison.

Safety Department

University of Wisconsin-Madison 30 North Murray Street Madison, Wisconsin 53715-2609
608/262-8769 FAX: 608/262-6767

3. Personnel who will handle the animals will be radiation workers as defined by our license. Additionally, as part of this initial training, they will receive training in emergency response, spill decontamination, radiation monitoring and dosimetry requirements (to include bioassays) by either Radiation Safety (preferred) or a SVM principal user. This additional training is currently conceived to be a practical exercise in spill detection and decontamination using a short-lived radionuclide (e.g., ^{99m}Tc, ^{18}F). Training will be documented and personnel without training will not be used in this program.

4. Personnel involved in this ^{131}I therapy will be enrolled in the Safety Department's bioassay program and will receive thyroid scans as detailed in BML # 48-09843-18.

5. Paragraph 5 of our original letter describes "Release of patients to owners..." These criteria are extracted from the "Guidelines for Release of Veterinary Nuclear Medicine Patients" promulgated by the Society of Veterinary Nuclear Medicine. As described, they require both a meter survey of the patient and a minimum confinement based upon the half-life of the administered radiopharmaceutical. Both criteria will be used and all patients will be surveyed prior to release to insure the exposure limits listed in para 5.a. of our application are met.

6. Values used in the exposure rate release criteria table were obtained from either Table 4.7, NUREG 1492; Table 2, Draft Regulatory Guide DG-8015; or Table 2, NCRP Report 37.

During our telephone discussion, you questioned our exposure rate release criteria. We are using Equation 7, NUREG-1492.

$$D_\infty = 1.44 \frac{\Gamma q_0 T_{eff}}{r^2}$$

In this instance, D_∞ is 100 mrem. We assumed that $T_p = T_e$ as a worst case. Placing all of our known values on one side and solving the equation for $\Gamma q_0/r^2$ gives:

$$\frac{\Gamma q_0}{r^2} = \frac{D_\infty}{1.44\,T_p} = \frac{100}{1.44\,T_p}$$

where T_p is in hours. If we were to make our measurements at 1 meter (100 cm), this equation is in units of mR/hr. Hence, our simplification:

$$\frac{mR}{hr} = \frac{100\,mR}{1.44 \times T_p}$$

For ^{131}I, this calculation becomes:

$$\frac{mR}{hr} = \frac{100\,mR}{1.44 \times T_p} = \frac{100\,mR}{1.44 \times 8\,day \times \frac{24\,hr}{day}} = 0.36\,\frac{mR}{hr}$$

This value is more conservative than that found in Column 4, Table 2, DG 8015 which uses Equation 2 in calculating Column 4. Equation 2 assumes 25% fraction is the highest dose likely to be received to total decay for longer lived ($T_{½}$ > 1 day) radionuclides. We also assume as a worst case, $T_p = T_e$. All other values are equal.

If you have any questions pertaining to this request, please call me at (608) 262-9178, FAX me at (608) 262-6767 or send me an eMail.

Sincerely,

Ronald R Bresell

Ronald R. Bresell
Radiation Safety Officer
Ronald.Bresell@mail.admin.wisc.edu

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION III
801 WARRENVILLE ROAD
LISLE, ILLINOIS 60532-4351

October 29, 1996

Ronald R. Bresell
Radiation Safety Officer
University of Wisconsin-Madison
Safety Department
30 North Murray Street
Madison, WI 53715

SUBJECT: ACKNOWLEDGEMENT OF CORRESPONDENCE
(Letter Dated 10/15/96)

Dear Licensee:

In response to your request, we have completed the initial processing, which is an administrative review of your application for a(n):

___ New License X Amendment ___ Renewal
___ Termination ___ Auth User (Amendment not required)
___ Other_____

No administrative deficiencies were identified during this initial review. However, it should be noted that a technical review may identify omissions in the submitted information.

It appears that your request is routine (see 1-3 below, as applicable).

1. New and amendment actions are normally processed within 90 days, unless we find major deficiencies, or policy issues requiring central program office assistance.

2. Renewal actions are normally processed within 180 days, however, under timely filing (before expiration), you may continue to operate under your existing license.

3. Termination actions are normally processed within 90 days, unless confirmatory surveys following decontamination/decommissioning activities are involved.

A copy of your correspondence has been forwarded to our Licensing Fee and Debt Collection Branch (301/415-6097) for approval of the fee category and amount, if required.

If you have a compelling safety or business-related reason for requesting expedited review, please contact the Materials Licensing Branch at (630) 829-9887. We will try to complete your request as soon as practicable. Any correspondence about this request should reference the control number.

Nuclear Materials Support Branch

Mail Control No. 301978
License No. 48-09843-18