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APPLICATION FOR MATERIAL LICENSE

030-30858

INSTRUCTIONS: SEE THE APPROPRIATE LICENSE APPLICATION GUIDE FOR DETAILED INSTRUCTIONS FOR COMPLETING APPLICATION. SEND TWO COPIES OF THE ENTIRE COMPLETED APPLICATION TO THE NRC OFFICE SPECIFIED BELOW.

APPLICATIONS FOR DISTRIBUTION OF EXEMPT PRODUCTS FILE APPLICATIONS WITH:

U.S. NUCLEAR REGULATORY COMMISSION
DIVISION OF FUEL CYCLE AND MATERIAL SAFETY, NMSS
WASHINGTON, DC 20556

ALL OTHER PERSONS FILE APPLICATIONS AS FOLLOWS. IF YOU ARE LOCATED IN:

CONNECTICUT, DELAWARE, DISTRICT OF COLUMBIA, MAINE, MARYLAND, MASSACHUSETTS, NEW HAMPSHIRE, NEW JERSEY, NEW YORK, PENNSYLVANIA, RHODE ISLAND, OR VERMONT, SEND APPLICATIONS TO:

U.S. NUCLEAR REGULATORY COMMISSION, REGION I
NUCLEAR MATERIALS SAFETY SECTION B
475 ALLENDALE ROAD
KING OF PRUSSIA, PA 19406

ALABAMA, FLORIDA, GEORGIA, KENTUCKY, MISSISSIPPI, NORTH CAROLINA, PUERTO RICO, SOUTH CAROLINA, TENNESSEE, VIRGINIA, VIRGIN ISLANDS, OR WEST VIRGINIA, SEND APPLICATIONS TO:

U.S. NUCLEAR REGULATORY COMMISSION, REGION II
NUCLEAR MATERIALS SAFETY SECTION
101 MARIETTA STREET, SUITE 2900
ATLANTA, GA 30323

IF YOU ARE LOCATED IN:

ILLINOIS, INDIANA, IOWA, MICHIGAN, MINNESOTA, MISSOURI, OHIO, OR WISCONSIN, SEND APPLICATIONS TO:

U.S. NUCLEAR REGULATORY COMMISSION, REGION III
MATERIALS LICENSING SECTION
799 ROOSEVELT ROAD
GLEN ELLYN, IL 60137

ARKANSAS, COLORADO, IDAHO, KANSAS, LOUISIANA, MONTANA, NEBRASKA, NEW MEXICO, NORTH DAKOTA, OKLAHOMA, SOUTH DAKOTA, TEXAS, UTAH, OR WYOMING, SEND APPLICATIONS TO:

U.S. NUCLEAR REGULATORY COMMISSION, REGION IV
MATERIAL RADIATION PROTECTION SECTION
611 RYAN PLAZA DRIVE, SUITE 1000
ARLINGTON, TX 76011

ALASKA, ARIZONA, CALIFORNIA, HAWAII, NEVADA, OREGON, WASHINGTON, AND U.S. TERRITORIES AND POSSESSIONS IN THE PACIFIC, SEND APPLICATIONS TO:

U.S. NUCLEAR REGULATORY COMMISSION, REGION V
NUCLEAR MATERIALS SAFETY SECTION
1480 MARIA LANE, SUITE 210
WALNUT CREEK, CA 94596

PERSONS LOCATED IN AGREEMENT STATES SEND APPLICATIONS TO THE U.S. NUCLEAR REGULATORY COMMISSION ONLY IF THEY WISH TO POSSESS AND USE LICENSED MATERIAL IN STATES SUBJECT TO U.S. NUCLEAR REGULATORY COMMISSION JURISDICTION.

1. THIS IS AN APPLICATION FOR (Check appropriate item)

- A. NEW LICENSE
- B. AMENDMENT TO LICENSE NUMBER _____
- C. RENEWAL OF LICENSE NUMBER _____

2. NAME AND MAILING ADDRESS OF APPLICANT (Include Zip Code)

Matritech Inc.
763 Concord Avenue
Cambridge, MA 02139

3. ADDRESS(ES) WHERE LICENSED MATERIAL WILL BE USED OR POSSESSED.

Matritech Inc
763 Concord Avenue
Cambridge, MA 02139

4. NAME AND ADDRESS OF PERSON CONTACTED ABOUT THIS APPLICATION

Jacqueline S. Miller

TELEPHONE NUMBER

(617) 661-6660

SUBMIT ITEMS 5 THROUGH 11 ON 8 1/2 x 11" PAPER. THE TYPE AND SCOPE OF INFORMATION TO BE PROVIDED IS DESCRIBED IN THE LICENSE APPLICATION GUIDE.

5. RADIOACTIVE MATERIAL
a. Element and mass number, b. chemical and/or physical form, and c. maximum amount which will be possessed at any one time.

6. PURPOSE(S) FOR WHICH LICENSED MATERIAL WILL BE USED.

7. INDIVIDUAL(S) RESPONSIBLE FOR RADIATION SAFETY PROGRAM AND THEIR TRAINING AND EXPERIENCE.

8. TRAINING FOR INDIVIDUALS WORKING IN OR FREQUENTING RESTRICTED AREAS.

9. FACILITIES AND EQUIPMENT.

10. RADIATION SAFETY PROGRAM.

11. WASTE MANAGEMENT.

12. LICENSEE FEES (See 10 CFR 170 and Section 170.31)

FEE CATEGORY **3M** AMOUNT ENCLOSED **\$700.00**

13. CERTIFICATION. (Must be completed by applicant) THE APPLICANT UNDERSTANDS THAT ALL STATEMENTS AND REPRESENTATIONS MADE IN THIS APPLICATION ARE BINDING UPON THE APPLICANT.

THE APPLICANT AND ANY OFFICIAL EXECUTING THIS CERTIFICATION ON BEHALF OF THE APPLICANT, NAMED IN ITEM 2, CERTIFY THAT THIS APPLICATION IS PREPARED IN CONFORMITY WITH TITLE 10, CODE OF FEDERAL REGULATIONS, PARTS 30, 32, 33, 34, 35, AND 40 AND THAT ALL INFORMATION CONTAINED HEREIN, IS TRUE AND CORRECT TO THE BEST OF THEIR KNOWLEDGE AND BELIEF.

WARNING: 18 U.S.C. SECTION 1001 ACT OF JUNE 25, 1948, 62 STAT. 749 MAKES IT A CRIMINAL OFFENSE TO MAKE A WILLFULLY FALSE STATEMENT OR REPRESENTATION TO ANY DEPARTMENT OR AGENCY OF THE UNITED STATES AS TO ANY MATTER WITHIN ITS JURISDICTION.

SIGNATURE—CERTIFYING OFFICER

Graham P. Lidgard

TYPED/PRINTED NAME

Graham P. Lidgard, Ph.D.

TITLE

Vice President,
Research & Development

DATE

Oct 14, 1988

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REG1 LIC30
20-28293-01 PDR

FOR NRC USE ONLY

TYPE OF FEE App	FEE LOG Oct 26 I	FEE CATEGORY 3M	COMMENTS	APPROVED BY <i>Mr. Messer</i>
AMOUNT RECEIVED \$700	CHECK NUMBER 525			158736 10/14/88

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17 OCT 1988

ITEM 5 RADIOACTIVE MATERIAL

<u>ELEMENT AND MASS NUMBER</u>	<u>CHEMICAL/PHYSICAL FORM</u>	<u>MAXIMUM AMT</u>
^3H	Any form as applicable	30 mC
^{14}C	Any form as applicable	30 mC
^{35}S	Any form as applicable	75 mC
^{125}I	Protein bound; NaI	30 mC
^{32}P	any form as applicable	50 mC
^{57}CO	Any form as applicable	

ITEM 6 PURPOSES FOR WHICH LICENSED MATERIAL WILL BE USED

All radioactive material will be used for biomedical and biological research purposes. Individual radioisotopes will be used as follows:

^3H	<u>In vivo</u> labeling of cells for analysis of protein and nucleic acids.
^{14}C	<u>In vivo</u> labeling of cells for protein analysis; labeling of polypeptide in <u>in vitro</u> translation; radioimmunoassay.
^{35}S	<u>In vivo</u> labeling of cells for protein analysis; labeling of polypeptide during in vitro translation; incorporation into nucleic acid for DNA sequencing.
^{125}I	Iodination of proteins for analysis; radioimmunoassay.
^{32}P	<u>In vivo</u> labeling of cells for analysis of nucleic acids; labeling of nucleic acids in vitro for DNA sequencing and analysis of RNA and DNA.
^{57}CO	Labeling of proteins by crosslinking for analysis

ITEM 7 Individual(s) Responsible for Radiation Safety Program: Their training and Experience

Matritech's Radiation Safety Officer (RSO) will be Dr. Jacqueline S. Miller and alternate RSOs will be Dr. Graham Lidgard and Mr. William Lichtman. These individuals will be responsible for implementation of the radiation safety program and for overseeing all work involving the use of radioisotopes.

In addition the services of F.X. Masse, Associates will be employed to assist in radiation surveys and radiation safety program. The relevant experience of the designated safety officers is described below:

Dr. Jacqueline S. Miller

Training: University of Wisconsin - Radiation Safety Training Program, Courses in Principles of Radicisotopes
Harvard University - Radiation Training Course
Experience: 18 years experience in the use of ^3H , ^{14}C , ^{35}S , and ^{32}P in millicurie amounts in basic biological experimentation at University of Wisconsin, Brandeis University and Harvard University.

Dr. Graham Lidgard

Training: University of Manchester - Radiation Safety and
University of Edinburgh - Radiation Safety Course
Corning Medical, Medfield, MA - Radiation Safety Training.
Experience: 20 years experience working with radioisotopes ^3H , ^{14}C , ^{125}I , ^{57}CO , Fe, ^{35}S , ^{32}P in biological experimentation and clinical diagnostics.

Mr. William Lichman

Training: Radiation Training Course, Baxter Healthcare Corporation/Dade Division, Cambridge, MA.
Experience: Three years experience using ^{125}I in radioimmunoassay manufacturing and development and ^3H and ^{57}CO for protein labelling.

ITEM 8 Training for Individuals Working in or Frequenting Restricted Areas

Training program for personnel will be provided at the start of employment and access to restricted areas will be limited to individuals trained and authorized for the use of radioisotopes. Personnel beginning work with radioisotopes or working with new forms will be retrained prior to the onset of the experiments. Each individual will be informed as to the safe handling and use of isotopes, the potential hazards of these materials, the nature of the experiments being conducted and the necessary precautions required. All personnel will be instructed in the principles and practices of radiation safety as described in Item 10, including instruction on survey and monitoring procedures. Yearly instruction in radiation safety will be provided to all employees by F.X. Masse, Associates.

ITEM 9 Facilities Equipment

1). Facilities:

Specific laboratories will be designated as restricted for

the use of radioisotopes and will be indicated by radiation caution signs on the doors. Access to these areas will be limited to those individuals trained and authorized to use radioisotopes. These laboratories will be equipped with closed-top waste containers for the routine collection of dry radioactive wastes and separate containers for liquid waste. Within these restricted laboratories specific areas will be designated for the use of ^{32}P and ^{125}I . For the use of ^{32}P , a plexiglass-shielded work station will be used which will be equipped with pipettes, safety glasses, forceps, glass tubes and other disposables specifically for use in this area. Work involving the use of ^{125}I will be carried out in a commercially available radioisotope hood.

A sink within the restricted area will be designated for the disposal of permissible amounts of radioisotopes and will be indicated as such by radiation caution signs. A floor plan showing the location of restricted areas and the placement of equipment within these areas is included.

The area enclosed by the dashed line will be considered restricted and entry sites will be posted with radiation caution signs. The isolation room (labeled 132) will contain the radioisotope hood, the ^{32}P work station, storage for waste decay, and an under the counter refrigerator for storage of radioisotopes. The adjacent room (132E) will contain a gamma counter and a liquid scintillation counter and containers for solid waste.

2) Equipment

Equipment for the use of radioisotopes such as centrifuges, vortexes, gel driers etc., will be clearly marked with radiation caution signs as will refrigerators and freezers used for the storage of these materials.

Radioisotope detection devices will be as follows:

- 1) Packard Instrument model 800CD6 gamma counter
- 2) Beckman Instrument model LS1801 liquid scintillation counter
- 3) Ludlum model #2000 with Ludlum model 44-3 NaI probe
- 4) Ludlum model #3 with Ludlum Model 44-7
Thin end Window Geiger probe.

ITEM 10. Radiation Safety Program

- A. General safety instructions and precautions will be carried out by all radioisotope users. All individuals working with radioactive materials will be trained by the Radiation Safety Officer prior to any use of these materials and will adhere to the safety requirements which include:

- 1) No smoking, eating, or drinking where radioactive materials are used, handled, transferred or stored.
- 2) No storage of food or beverages permitted in areas where radioisotopes are stored.
- 3) No mouth pipetting of radioactive solutions
- 4) Where hand or clothing contamination by radioactive materials is possible, protective gloves and lab coats will be worn. Upon completion of the work, skin, hair and clothing will be surveyed for contamination.
- 5) All containers of radioactive materials will be labeled as to their contents, amount and date.
- 6) Objects and equipment from restricted areas will be surveyed routinely for contamination. If contamination is detected, decontamination procedure prescribed by the Radiation Safety Officer will be carried out.
- 7) All work which may result in significant amounts of airborne radioactivity (e.g., heating, evaporation to dryness) will be performed in a fume hood. Iodination of proteins will be carried out in a commercially available radioisotope hood.
- 8) All work surfaces where radioisotopes will be used will be covered with plastic backed absorbent paper; all work surfaces will be non-absorbent epoxy and all floors non-absorbent linoleum tile for easy decontamination.

B. Specific precautions will be taken for the use of ^{32}P and ^{125}I . The following procedures will be standard:

- 1) For ^{32}P
 - a) A plexiglass shield will be used to shadow-shield the experimenter when significant levels (<150 uC) of ^{32}P are being used.
 - b) Disposable gloves will be worn
 - c) Body badge will be worn at all times during work with ^{32}P . Finger rings will be worn when working with greater than 100 uC.
 - d) Eye protection (prescription glasses or safety glasses) will be worn when greater than 100 uC of ^{32}P are being used.

- e) Hands, exposed skin surfaces, hair and clothing will be monitored with a hand held detector prior to leaving the work area where ^{32}P has been used.
 - f) Any non-disposable materials (e.g. glassware) will be decontaminated in Count Off (NEN), washed, and surveyed with a hand held monitor.
- 2) Specific precautions for the use of ^{125}I include:
- a) Only persons having prior experience or appropriate training will carry out protein iodinations.
 - b) The Radiation Safety Officer will be notified prior to each experiment involving ^{125}I .
 - c) Room air samples will be taken and monitored by F.X. Masse Association until it is clearly established that routine procedures result in acceptable airborne levels. ($<10\%$ MPC)
 - d) All procedures will be conducted in a commercially available radioisotope hood.
 - e) The process will be carried out to completion; all materials including columns and glassware will be decontaminated, washed and surveyed. All areas will be surveyed upon completion of the procedure.
 - f) All personnel involved will have thyroid counts within two working days of the procedure.
- C. Instructions to personnel handling radioactive material will be provided with the following information:
- 1) Availability, use and location of safety-related materials such as lab coats, gloves, remote pipetting devices, safety glasses, etc.
 - 2) The nature and hazards of radioisotopes to be used and special precautions and procedures required in each instance.
 - 3) Instructions for the performance of routine surveys and monitoring procedures.
 - 4) Precautions to be taken in transporting and opening vials of radioactive materials.
 - 5) Safety requirements for storage of radioactive materials, including specific locations, labeling of radioisotopes and storage of contaminated materials.

- 6) The availability and required usage of personnel monitoring devices such as body badges and finger rings.
- 7) Procedures for emergency situations involving spills as described in section D.
- 8) Procedures for the picking up, receiving and opening of packages containing radioactive materials.
- 9) Instructions for good radiation safety practices as described in the beginning of this section.
- 10) Waste disposal procedures including location of disposal areas, limitations on the disposal of liquids into the sewers and procedures for collection, storage and disposal of other wastes.

D. Emergency procedures in the event of accidents involving radioactive materials will include:

- 1) For minor spills
 - a. Notify personnel in the area
 - b. Cover the spill with absorbent paper
 - c. Using disposable gloves and remote handling tongs, fold the absorbent paper, place into plastic bag and dispose of in the radioactive waste container, along with all other contaminated disposables.
 - d. Survey the area, using the appropriate detection system, survey meter for high beta and gamma emitters, wipe test for low B emitters.
 - e. Report the incident to the Radiation Survey Officer
- 2) For major spills
 - a. Clear the area and notify the Radiation Safety Officer
 - b. Cover the spill but do not attempt to clean up.
 - c. Shield the spill with plexiglass if possible.
 - d. Close off the room and lock to prevent entry
 - e. Remove any contaminated clothing and store. Monitor skin and hair and wash thoroughly any contaminated areas.
 - f. Contact F.X. Masse Assoc. for assistance.

- E. An Area Survey Program will be carried out on a routine basis. Individual users of radioactive materials will be expected to perform area surveys of work sites and laboratories to insure that working surfaces, floor, equipment, etc., are free of contamination. When contamination cannot be removed, these areas will be clearly indicated by radiation caution signs. The Radiation Safety Officer and F.X. Masse. Assoc. will perform area surveys of radiation work areas at appropriate intervals to insure that exposure of personnel to radiation is minimal. An area survey will be carried out prior to the introduction of radioactive materials into a restricted area in order to establish a baseline.

Area survey procedures will be carried out as follows:

1. All restricted areas will be surveyed on each day of use with an appropriate monitor and decontaminated if necessary. The date, identification of person doing survey and findings will be recorded in a log.
2. Waste storage areas will be surveyed weekly.
3. All areas will be surveyed on a monthly basis and will consist of the following:
 - a) Measurement of radiation levels with a survey meter sufficiently sensitive to detect 0.1mR/hr.
 - b) A series of wipe tests to determine contamination of surface areas. Dampened filter disks will be used to test the areas. For high beta emitters, wipes will be measured using a G.M. survey meter. Analysis of wipes will also be carried out by measurement in a Beckman liquid scintillation counter models 1801 and a Packard Instruments Model 800CD6 gamma counter.
4. A permanent record will be kept of all survey results, including negative results. The record will include:
 - a) Location, date and identification of equipment used, including counting efficiencies.
 - b) Name of person conducting the survey.
 - c) Drawing of area surveyed, identifying relevant features such as active storage areas, active waste areas, etc.
 - d) Measured contamination, keyed to location on drawing and indicating areas that require corrective action.
 - e) Corrective action taken in case of contamination, levels after corrective action, and comments.
5. The area will be decontaminated if levels exceed 200 pm/cm²

6. Room air samples will be conducted subsequent to protein iodination procedures with the help of F.X. Masse Associates. Air samplings will be carried out after each iodination until it is ascertained that the routine procedure results in no excessive airborne levels. Quarterly samplings will then be carried out.

7. Survey equipment to be used will include:

- a) Ludlum Model #2000 with Ludlum Model 44-3 NaI Probe
- b) Ludlum Model #3 with Ludlum Model 44-7 Thin end Window Geiger probe.
- c) Beckman Liquid Scintillation counter Model 1108 for the detection of ^3H , ^{14}C , ^{35}S and ^{32}P for the purpose of surveying, assaying and measuring.
- d) Packard Instruments Model 800CD6 gamma counter for the detection of ^{125}I and ^{52}Co for surveying, assaying and measuring.

These instruments will be calibrated on an annual or semi-annual basis by F.X. Masse. Assoc. Weekly checks will be carried out using standards of high beta emitter for the hand held monitors or a set of standards for the counters.

F. Personnel monitoring will be carried out as follows:

1. Body badges will be issued to all individuals employed by Matritech. Finger rings will be issued to personnel using greater than 100 μC of P^{32} . Badges and rings will be supplied by Landauer.
2. Appropriate internal radiation monitoring will be conducted in instances where a potential exists for receiving doses in excess of 20% of the limits established in 10 CFR 20.
 - a) ^{125}I in vivo thyroid counting
 - 1) All individuals routinely working with greater than 1mC of ^{125}I will participate in the in vivo thyroid counting program conducted by the Radiation Safety Officer.
 - 2) The RSO will arrange routine monthly thyroid measurements for such individuals.
 - 3) Individuals conducting iodination procedures will have thyroid burden measured with one work-week of the experiment.
 - 4) Maximum permissible weekly increase of ^{125}I in the thyroid is established as 0.05 mC em if thyroid measurement indicates greater than 0.05 mC in the

thyroid. The Radiation Safety Officer will initiate investigation of practices and procedures to determine the cause of increased iodine uptake. Depending on the level of radioisotope in the thyroid, the individual may be restricted temporarily from further radioiodine work.

b) ^3H urinalysis

- 1) All individuals working greater than 10mC of ^3H will participate in urinalysis program conducted by RSO.
- 2) If bioassay indicates the presence of greater than 10% the maximum permissible body burden (3 uC/liter) the RSO will initiate an investigation of processes and procedures. Depending on the levels of ^3H in the individual further work with this isotope may be temporarily restricted.

G. A Records Management Program will be initiated by a means of maintaining records on

- 1) surveys conducted
- 2) personnel exposures
- 3) material inventories
- 4) receipt, utilization and disposal of isotopes
- 5) disposal of liquid wastes in sewer system

These records will be maintained by the Radiation Safety Officer

ITEM 11 Waste Disposal Management

Procedures for the disposal of radioactive waste will be as follows:

1. Each laboratory in restricted areas will be equipped with a closed-top waste container for routine collection of dry radioactive waste and an unbreakable liquid waste container filled with absorbent material.
2. Records will be kept by laboratory personnel of amounts of radioactivity placed in the containers.
3. When these containers are full, the RSO will be notified and transfer of this material to a waste drum for storage until removal.
4. Radioactive waste will be separated according to half-life. For example, ^{32}P waste will be stored for decay and therefore will be collected separately from longer lived materials.

5. Wastes from short-lived materials will be stored for decay for at least 10 half-lives before disposal as normal trash. Before disposal, waste will be monitored with a thin-window survey meter and waste registering background will be disposed of as non-radioactive.
6. No radioactive materials or disposables contaminated with radioactivity will be placed in normal trash receptacles. All normal trash leaving a restricted area will be monitored with a survey meter.
7. Low level liquid wastes that are soluble or dispersible in water may be disposed of into the sewer system in quantities which comply with regulations in 10 CFR part 2D. Each laboratory in the restricted areas will have a designated sink for such disposal. Each sink will be signified by a radiation sign and a log sheet for recording the amount of radioactivity.
8. Radioactive waste materials with extended half-lives will be transferred to waste drums and these drums will be transferred to U.S. Ecology for the appropriate disposal.

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