NRC FORM 374
(7-94)

U.S. NUCLEAR REGULATORY COMMISSION

MATERIALS LICENSE

Amendment No. 56

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

Licensee	
1. Genzyme Transgenics Corporation	In accordance with the letter dated October 21, 1994,
2. 25 Birch Street Milford, Massachusetts 01757	3. License Number 20-01489-01 is amended in its entirety to read as follows:
	4. Expiration Date October 31, 2001
	5. Docket or Reference No. 030-04605

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 with atomic number 3 through 83 with half life of 120 days or less	A. Any	A. Not to exceed 10 millicuries per radionuclide and 1 curie total
B. Any byproduct material with atomic number 1 through 95 with half life of greater than 120 days	B. Any	B. See Condition 12
C. Technetium 99m	C. Any	C. 100 millicuries
D. Iodine 125	D. Any	D. 50 millicuries
E. Hydrogen 3	E. Foils	E. Not to exceed 250 millicuries per foil and 5000 millicuries total

9. Authorized use

A. through D. Research and development as defined in 10 CFR 30.4; animal studies.
E. In electron capture detector cells that are distributed under a specific license issued by the U.S. Nuclear Regulatory Commission or any Agreement State.

CONDITIONS

10. Licensed material may be used only at the licensee's facilities located at 57 Union Street, Worcester, Massachusetts; and in Cambridge, Massachusetts at: 30 Memorial Drive (second floor), 134 Main Street, and 83 Rogers Street.

11. A. Licensed material shall be used by, or under the supervision of individuals designated in writing by the Radiation Safety Committee, Paul Zavorskas, Chairperson.

B. The Radiation Safety Officer for this license is R. Jeffrey Grant.

12. If only one radionuclide is possessed, the possession limit is 10,000 times the quantity specified for that radionuclide in Appendix B to 10 CFR 30. If two or more radionuclides are possessed, the possession limit is determined as follows: For each radionuclide, determine the ratio of the quantity possessed to 10,000 times the applicable quantity specified in Appendix B to 10 CFR 30 for that radionuclide. The sum of the ratios for all radionuclides possessed under the license shall not exceed unity.

13. Licensed material shall not be used in or on human beings.

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

15. The licensee shall not use licensed material in field applications where activity is released except as provided otherwise by specific condition of this license.

16. The licensee shall not acquire licensed material in a sealed source or device unless the source or device has been registered with the U.S. Nuclear Regulatory Commission pursuant to 10 CFR 32.210 or equivalent regulations of an Agreement State.

17. Sealed sources or detector cells containing licensed material shall not be opened or sources removed from source holders by the licensee.

18. A. Detector cells containing a titanium tritide foil or a scandium tritide foil shall only be used in conjunction with a properly operating temperature control mechanism which prevents the foil temperatures from exceeding that specified in the certificate of registration referred to in 10 CFR 32.210.

    B. When in use, detector cells containing a titanium tritide foil or a scandium tritide foil shall be vented to the outside.

19. The licensee shall conduct a physical inventory every six months to account for all sealed sources and devices containing licensed material received and possessed under the license.

20. A. Sealed sources and detector cells containing licensed material shall be tested for leakage and/or contamination at intervals not to exceed six months or at such other intervals as are specified by the certificate of registration referred to in 10 CFR 32.210, not to exceed three years.

    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 three months.

    C. In the absence of a certificate from a transferor indicating that a leak test has been made within six 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 and detector cells 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 transfer 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 test shall be capable of detecting the presence of 0.005 microcurie of radioactive material on the test sample. 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 or detector cell shall be removed immediately from service and decontaminated, repaired, or disposed of in accordance with Commission regulations. The report shall be filed within five days of the date the leak test result is known with the U.S. Nuclear Regulatory Commission, Region I, ATTN: Chief, Nuclear Materials Safety Branch, 475 Allendale Road, King of Prussia, Pennsylvania 19406. The report shall specify the source or detector cell involved, the test results, and corrective action taken.

G. The licensee is authorized to collect leak test samples for analysis by licensee. Alternatively, tests for leakage and/or contamination may be performed by persons specifically licensed by the Commission or an Agreement State to perform such services.

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

A. Waste to be disposed of in this manner shall be held for decay a minimum of ten half-lives.

B. Before disposal as ordinary trash, the waste shall be surveyed at the container surface with the appropriate survey instrument 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.

MATERIALS LICENSE
SUPPLEMENTARY SHEET

License Number: 20-01489-01

Docket or Reference Number: 030-04605

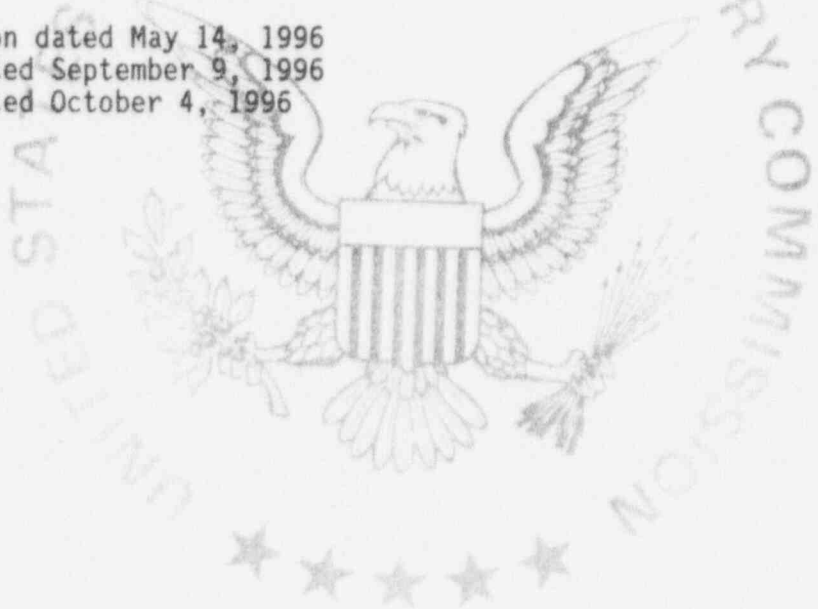
Amendment No. 56

C. A record of each such disposal permitted under this License Condition shall be retained for three 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.

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

23. 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 Nuclear Regulatory Commission's regulations shall govern unless the statements, representations, and procedures in the licensee's application and correspondence are more restrictive than the regulations.

A. Application dated May 14, 1996
B. Letter dated September 9, 1996
C. Letter dated October 4, 1996



Date OCT 21 1996

For the U.S. Nuclear Regulatory Commission

By Original Signed By:
John D. Kinneman

Division of Nuclear Materials Safety
Region I
King of Prussia, Pennsylvania 19406

OCT 2 1 1996

License No. 20-01489-01
Docket No. 030-04605
Control No. 120639

John Green
Vice President
Genzyme Transgenics Corporation
25 Birch Street
Milford, MA 01757

Dear Mr. Green:

Please review the enclosed document carefully and be sure that you understand all conditions. If there are any errors or questions, please notify the U.S. Nuclear Regulatory Commission, Region I Office, Licensing Assistance Team, (610) 337-5093 or 5239, so that we can provide appropriate corrections and answers.

Please be advised that your license expires at the end of the day, in the month, and year stated in the license. Until your license is terminated, you must conduct your program involving byproduct materials in accordance with the conditions of your NRC license, representations made in your license application, and NRC regulations. In particular, note that you must:

1. Operate in accordance with NRC regulations 10 CFR Part 19, "Notices, Instructions and Reports to Workers; Inspections," 10 CFR Part 20, "Standards for Protection Against Radiation," and other applicable regulations.

2. Notify NRC, in writing, within 30 days:

   a. when an authorized user or Radiation Safety Officer, permanently discontinues performance of duties under the license or has a name change; or

   b. when the mailing address on the license changes (no fee is required if the location of byproduct material remains the same).

3. In accordance with 10 CFR 30.36(b) and/or license condition, notify NRC, promptly, in writing, and request termination of the license when you decide to terminate all activities involving materials authorized under the license.

OFFICIAL RECORD COPY **ML 10**

4. Request and obtain a license amendment before you:

   a. permit anyone to work as an authorized user under the license;

   b. change Radiation Safety Officer;

   c. order byproduct material in excess of the amount, or radionuclide, or form different than authorized on the license;

   d. add or change the areas of use, or address or addresses of use identified in the license application or on the license; or

   e. change ownership of your organization.

5. Submit a complete renewal application with proper fee or termination request at least 30 days before the expiration date of your license. You will receive a reminder notice approximately 90 days before the expiration date. Possession of byproduct material after your license expires is a violation of NRC regulations. A license will not normally be renewed, except on a case-by-case basis, in instances where licensed material has never been possessed or used.

In addition, please note that NRC Form 313 requires the applicant, by his/her signature, to verify that the applicant understands that all statements contained in the application are true and correct to the best of the applicant's knowledge. The signatory for the application should be the licensee or a certifying official of the licensee rather than the Radiation Safety Officer or a consultant.

You will be periodically inspected by the NRC. Failure to conduct your program in accordance with NRC regulations, license conditions, and representations made in your license application and supplemental correspondence with NRC will result in enforcement action against you. This could include issuance of a notice of violation, or imposition of a civil penalty, or an order suspending, modifying or revoking your license as specified in the "General Statement of Policy and Procedure for NRC Enforcement Actions," (Enforcement Policy), NUREG 1600.

Since serious consequences to employees and the public can result from failure to comply with NRC requirements, prompt and vigorous enforcement action will be taken when dealing with licensees who do not achieve the necessary meticulous attention to detail and the high standard of compliance which NRC expects of its licensees.

Thank you for your cooperation.

Sincerely,

Original Signed By:
John D. Kinneman
John D. Kinneman, Chief
Nuclear Materials Safety Branch 2
Division of Nuclear Materials Safety

License No. 20-01489-01
Docket No. 030-04605
Control No. 120639

Enclosures:
1. Amendment No. 56
2. 10 CFR Parts 2, 19, 20, 30, and 170
3. NRC Forms 3 and 313

cc:
R. Jeffrey Grant
Radiation Safety Officer
GTC/TSI Mason Laboratories
57 Union Street
Worcester, MA 01608

DOCUMENT NAME: R:\WPS\MLTR\L?001489.01
To receive a copy of this document, indicate in the box: "C" = Copy w/o attach/encl "E" = Copy w/ attach/encl "N" = No copy

OFFICE	DNMS/RI	N	DNMS/RI	N				
NAME	SLodhi		JKinneman					
DATE	10/21/96		10/21/96		10/ /96		10/ /96	

OFFICIAL RECORD COPY

genzyme TSI transgenics

Mason Laboratories

MS-16
Q2

4 October 1996

Sattar Lodhi
Nuclear Materials Safety Branch 2
Division of Nuclear Materials Safety
475 Allendale Road
King of Prussia, PA 19406-1415

Subject: Renewal to By-Product Materials License No. 20-01489-01 (extended)
Mail Control No. 120639

Dear Mr. Lodhi:

Enclosed you will find our response the issues you raised concerning the above subject in our phone conversation on 9-18-96.

Sincerely,

J Grant

R. Jeffrey Grant
Radiation Safety Officer
GTC Mason Laboratories
57 Union Street
Worcester, MA 01608

OCT - 7 1996

OFFICIAL RECORD COPY ML 10

Mason Laboratories • 57 Union Street • Worcester, MA 01608 • TEL 508-791-0931 • FAX 508-753-1834

Question #5:

The quorum indicated in the response represents three out of five committee members. At your suggestion, we are adding a sixth person to the committee. This will be Jane Snell, Director of Regulatory Compliance.

Question #10:

The release of facilities, equipment and materials for unrestricted use will be approved by the RSO.

Question #12:

The transfer of wipe test samples from 30 Memorial Drive to 57 Union Street is part of the decommissiong process on-going at 30 Memorial Drive and 134 Main Street.

Question #13:

Authorized users at GTC hold the position of Study Director. As such they have demonstrated experience in performing and directing studies which involve the use radioactive materials and have, as a minimum, a Masters' Degree.

Question #14:

Emergency numbers for daytime and off-duty hours, including the RSOs name and office phone, are posted near each phone in the radiation laboratory and animal facilities.

Question #15:

The General Laboratory Safety Practices have been updated to include an instruction that all licensed material will be secured when not under surveillance and control of the authorized users. Stock material is stored locked at the appropriate temperature. Material in use (i.e., μCi quantities) are kept under surveillance. Access to the building is only by card access or past a receptionist, visitor's passes are required.

Question #19:

In addition to the Contamination Action Limits presented, the maximum ambient dose rate is 0.5 mrem/hr.

In addition, the General Laboratory Safety Practices have been updated to include surveying the area of use when tasks with radioactive materials are completed.

Question #20:

Should the 0.5 mrem/hr dose rate be exceeded, action to isolate and/or shield the source will be undertaken.

Question #21:

ICN is a NVLAP approved facility. Their NVLAP lab code is 0555.

120639

MNSB TELEPHONE CONVERSATION RECORD

Person Called: Jeffrey Grant **Phone No.:** (202) 287 3615

Person Calling: Sattar Lodhi **Date:** 9/17/96

Facility Name: Genzyme Transgenics Biodevelopment Labs **Time:** 8:30 a.m.

License No. 20-01489-01 **Docket No.** 030-04605

Subject: Additional Information for renewal request

Summary: I called Mr. Grant to request the confirmation of the following:

a. A representative of senior management will be included in RSC (5)

b. Facilities will not be released until approved by RSO (10)

c. 30 Memorial Dr/134 Main St locations' status (12)

d. What is meant by technical qualifications of proposed users (13)

e. RSO's phone number will be included in emergency procedures (14.c)

f. Instructions to secure licensed materials will be included (15.J)

g. Routine surveys of the labs at the end of work (19)

h. Action levels for ambient dose rates (20)

i. Film badges will be processed by a NVLAP vendor (21)

Action Required/Taken: Document/wait for response

Signature: Sattar Lodhi Mail Control No. 120639

9/27/96 Reminded him again to send the response soon. Stated that we should get it by the end of next week.

Sattar Lodhi

OFFICIAL RECORD COPY **ML 10**

genzyme TSI transgenics

M516
Q-2

September 9, 1996

John D. Kinneman, Chief
Nuclear Materials Safety Branch 2
Division of Nuclear Materials Safety
475 Allendale Road
King of Prussia, PA 19406-1415

Subject: Renewal to By-Product Materials License No. 20-01489-01 (extended)
Mail Control No. 120639

Dear Mr. Kinneman,

Regarding the above subject, the following additional information is provided for your review.

GTC's management has reviewed the application for license renewal and this response to questions pertaining to that application and concurs in the statements and representations contained therein.

We would be pleased to provide any additional information that you may need. Please do not hesitate to contact me if you have any questions.

Sincerely,

J Grant

R. Jeffrey Grant
Health & Safety Officer
Proposed Radiation Safety Officer
GTC Mason Laboratories
57 Union Street
Worcester, MA 01608

Sincerely,

John B Green

John Green
Vice President & CFO
Genzyme Transgenics Corporation
25 Birch Street
Milford, MA 01757

cc:
Joe Swiniarski
Current Radiation Safety Officer
GTC Mason Laboratories
57 Union Street
Worcester, MA 01608

OFFICIAL RECORD COPY

ML 10

120639

SEP 10 1996

1. **Provide diagrams of facilities designed or established for special uses (e.g., iodination facilities, waste handling or processing facilities including waste compactor, incinerators, long-term storage facilities, animal facilities). Provide full details of facilities where airborne effluent may be released, such as your iodination and waste compacting facilities, including the size, location, fume hood or air handling system specifications, locations of filters and monitors for evaluating releases to the effluent.**

Attachment 1 includes floor plans for all facilities identified in License No. 20-01489-01 (extended) - 57 Union Street, Worcester, MA, 83 Rogers Street, Cambridge, MA and 30 Memorial Drive/134 Main Street, Cambridge, MA. At the Worcester site, specialized areas for iodination, long term stroage and animal facilities are identified. At the Cambridge Roges Street facility, facilities for waste storage and processing and long term storage are identified. No radioactive waste compacting is done. GTC is currently in the process of decommissioning the Cambridge 30 Memorial Drive/134 Main Street site and expects to submint a report for the NRC aproval by the end of December, 1996. Except as related to decommissioning, materials covered by this license will no longer be used in the facilities at this site. The designated long term storage and waste facilities will be used for the decommissioning effort only. Following release of the Cambridge 30 Memorial Drive/134 Main street site by the NRC, GTC plans to submit an amendment to remove this site from the license.

Room 471, at the 57Union Street facility, contains a fume hood where ^{125}I is stored and iodinations are performed. One to five mCi are handled at any one time. Hood air is pumped through a charcoal filter and vented through a stack leading to the outside. The hood is also equipped with a Gast air sampler (DCL-101-AA) in order to monitor the duct system (post charcoal filtration) as well as the restricted area (the laboratory atmosphere at the breathing zone) during the iodination process. All levels are recorded after counting in a gamma counter. A gamma spectrometer (Packard 5650) or Ludlum Model 3 survey meter are used to check the radioactivity of iodinated materials. The stock of radioactive material is stored in a refrigerator in the same laboratory.

2. **Provide a description or an organizational chart which shows that the Radiation Safety Officer and the Radiation Safety Committee each has a direct reporting path to senior management**.

An organizational chart showing the direct reporting path to management for the RSO and the Radiation Safety Committee (RSC) is provided in Attachment 2.

GTC has submitted an amendment to the license to change the RSO to R. Jeffrey Grant from Joseph Swiniarski. Mr Swiniarski has retired from full time employment but remains as a consultant to GTC and continues to be a member of the RSC.

3. **Provide a copy of senior management's written statement of delegation of authority to the Radiation Safety Officer. This statement should include the requisite authority to communicate with and direct your personnel regarding NRC regulations and license provisions and to enforce these requirements including the ability to terminate any unsafe operation involving the use of licensed material.**

Management's statement delegating authority to the RSO is provided in Attachment 3.

4. **Identify the Radiation Safety Committee Chairperson. Provide documentation on his/her training and experience involving licensed materials and identify his/her position in your organization. Do NOT submit a curriculum vitae for each member.**

The chariman of the RSC is Paul Zavorskas. He was the Radiation Safety Officer under Mason Laboratories previous radioactive materials license. His CV is found in Attachment 4.

5. **Specify the minimum representation that will be required at each meeting of Radiation Safety Committee, and the quorum requirements for voting.**

The minimum required representation for each RSC meeting, as specified in the Radiation Protection Plan (RPP), is the Committee Chair, RSO, and one other member. This group may vote on matters brought before the committee.

6. **Confirm that the Radiation Safety Officer's duties and responsibilities also include meeting with, and briefing the senior management at least once a year on the licensed program.**

The responsibilities of the RSO, as stated in the RPP include the preparation of an annual report for senior management. This plan will be delivered in person to facilitate the briefing of senior management.

7. **Describe your program for training and refresher training for all persons who handle licensed material or who frequent areas where licensed material is used. This training program must include a review of emergency procedures and response criteria and include sections that are tailored to various types of radiation and ancillary workers such as authorized users, laboratory supervisors and technicians; incinerator operators, waste compactor operators, and purchasing department personnel receiving licensed material; housekeeping, security, and other ancillary personnel; and the radiation safety office staff. Confirm that you will maintain records of initial and refresher training, that include a list of topic(s) covered, the amount of time spent and the date, the instructor(s) and student(s) names. The model training program in Appendix I of Draft Regulatory Guide DG-0005, Second Proposed Revision 2 (enclosed) may be helpful in formulating your response.**

Radiation training follows the same constructs as all training at Mason and Biodevelopment Laboratories. All training includes scope, special trainers, written references, competency, and documentation. All personnel working with or near radioactive materials attend radiation safety training. Ancillary personnel training includes a basic description of radiation, radiation symbol recognition, general hazard recognition, safety precautions, emergency response, and whom to contact if questions arise. Laboratory personnel working directly with radioactive materials are also trained on these safety basics. In addition, their training includes specific procedures for radiation hazard containment, disposal, detection, decontamination, and emergency response appropriate for the laboratory.

All training is performed by special trainers; a topic expert. Radiation training is performed by the Radiation Safety Officer, a specially prepared designee, or our consultant, Mitch Galanek (NRC Lic# 20-13302-01). All training includes a written reference, usually the RPP or a standard operating procedure. All training includes demonstrating competency. For radiation safety training this means a quiz and/or performing specific procedures. Documentation of training details the skill name, trainer, trainee, written reference (and date read), competency (and date performed). A historical record of each employee is on file.

8. **Specify the types of instruments that will be required for surveys and monitoring by users in laboratories at your facility. Describe the criteria you will use to determine the types, uses, and calibration of users' instruments.**

The hand held instruments used for surveys are Ludlum Model 3 or Model 12 survey instruments with either a Ludlum 44-9 GM Probe, or a Ludlum 44-3 NaI probe. The criteria for use are given in the table below. A Victoreen 450P is used to monitor gamma emissions from the cesium irradiator. Calibration is performed

every six months.

The criteria used to determine the appropriate instrument is dependent on the radiation emitted by the radioactive material, the quantity of material in use, and any additional specifics related to the material to be used.

The following table summarizes the counting systems used.

Counting Systems	Radiations Detected
Geiger-Mueller Detector	Low energy beta isotopes Energetic beta emitting isotopes Beta/Gamma emitting isotopes
Liquid Scintillation Detector	Hydrogen-3 (Tritium) (soft betas) Wipe tests
Gamma Counter	Gamma emitting isotopes Wipe tests
Sodium Iodide Scintillation Detector	Gamma emitting isotopes - I^{125}

9. You stated that handheld survey instruments will be calibrated every six months. Please confirm that all other survey instruments that are used to ensure compliance with requirements of 10 CFR Part 20 are calibrated at least annually.

LSC and Gamma counters will be calibrated annually and standardized (quality checked) monthly in according to the approved SOPs of the licensee.

10. Describe the surveys you will require and the criteria you will use for release of facilities and equipment for unrestricted use. Confirm that facilities and equipment will not be released until the results of surveys are reviewed and approved by the Radiation Safety Officer. A copy of the NRC "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source, or Special Nuclear Material" is enclosed for your information.

The procedures for release of facilities and equipment for unrestricted use are summarized below.

Prior to initiation of final surveys, records are reviewed and investigations made to determine if contamination existed in any area and was covered over to prevent its spread, such as by wall boarding, floor tiling or painting. Such identified areas are inspected, and if contamination is present under such surfaces, action is taken by the laboratory manager to have the area decontaminated to meet the criteria specified below, or dispose of the contaminated material as radioactive waste.

Equipment, parts, materials, and waste that have been exposed to radioactive contamination shall not be released for unrestricted use until they are inspected and show compliance with the release criteria found in Table 1 of the NRC Guide "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source, or Special Nuclear Material".

Surfaces of building materials that have been used for radioactive work and might have been exposed to radioactive contamination shall be surveyed using wipe tests, dose rate measurements and fixed contamination measurements.

11. **Describe your procedures for receiving and opening packages in accordance with requirements of 10 CFR 20.1906. 10 CFR 20.1906(a)(b) and (c) address package receipt requirements and state, in part, that each licensee shall monitor the surfaces of a labeled package for radioactive contamination within 3 hours of receipt if it is received during normal working hours or not later than 3 hours from the beginning of the next working day if it is received after normal working hours. 10 CFR 20.1906(e) addresses package opening requirements and states, in part, that each licensee shall establish and maintain written procedures for safely opening packages in which licensed material is received.**

Packages containing radioactive materials are received at the loading dock during normal business hours (8:30 - 5:00). Receiving personnel are provided with a Notice of Shipment Form (NOSF) prior to package delivery indicating the anticipated delivery date. When the package arrives, receiving personnel place the package in a designated location and notify the individual(s) on the NOSF. The package is picked up and transported to the laboratory. If the package appears to be damaged or wet, it is isolated and the RSO notified.

Dose rate measurements at the surface and at 1 meter are made. Wipe tests are done within 3 hours. The outer packaging, inner packaging and any vials are tested. If the removable contamination is <2200 dpm/100cm^2, the material is released for use. Removable contamination >2200 dpm/ 100cm^2 are reported to the RSO or his designate. Wipe test results are recorded and forwarded to the

RSO.

Packages of radioactive material are to be opened only in the designated radioisotope laboratories. If the radioactive sample is believed to be in a volatile form, the package will be opened in an operating fume hood.
Protective clothing (e.g., gloves, labcoat, eye protection) is worn during package opening. The outer package is opened, the packing slip is removed and inspected to verify that the shipment is in agreement with what was ordered. If special instructions for opening the isotope container are enclosed, these instructions are to be followed.

The inner container and the inner packing material are checked for contamination with a GM survey instrument and then wipe tested.

The inner container is removed then placed behind appropriate shielding, as necessary. The inner container is opened, monitored and inspected. The primary container is inspected for leakage (loss of volume, discoloration of the absorbing material, etc.). If present, monitor the lead pig for any leakage from the primary container.

The Radiation Safety Officer is notified if:

a. Contamination or leakage is detected.
b. If readings in excess of expected values are obtained on the survey meter or wipe test.
c. There is a discrepancy between the material received and that ordered.

If packaging proves not to be contaminated, all references to radioactive material are obliterated prior to disposing of the packaging material in the normal trash. Contaminated packaging is disposed of as radioactive waste.

12. Submit your procedures for transfer and transportation of licensed material between authorized users at your facility, and your procedures for transfer and transportation of licensed material to other licensees. Describe your program to control such transfers, including update of material inventory and audits of users' procedures.

In some instances, radiolabeled substances and/or wipe test samples are transferred between GTC facilities (i.e., Mason Laboratories, 57 Union St., 30 Memorial Drive, 134 Main St. or BDL, 83 Rogers St.). Substances and/or wipe test samples are wipe tested, packed securely and labelled properly according to all U.S. Department of Transportation regulations, and received following the same procedures describe above. No samples are transferred with scintillation cocktail.

Once at the destination, the scintillation cocktail may be added. Records of all transfers are kept by the primary investigator.

Material transfer to other licensees is preceded by a request for a copy of the recipients materials license and confirmation that their inventory will allow receipt. Packages will be wipe tested prior to shipping, and will be packaged and shipped by applicable DOT and IATA regulations. A confirmation of receipt form will be included.

Transport will be by common carrier such as Federal Express. All transfers or shipments will be approved by and reported to the RSO. Inventory records will be adjusted as necessary.

13. **Describe the criteria your Radiation Safety Committee (RSC) will use to approve authorized users and uses for activities utilizing licensed material. These criteria should specify the minimum acceptable standards for training and experience of the users, facilities and equipment, the operating or handling procedures, the types of surveys or monitoring and the survey frequency requirements. Your application must provide sufficient detail to assure that the RSC evaluations are sufficient in scope and depth to satisfy 10 CFR 33.13(c)(3). The review and approval must be documented by the RSC prior to use of licensed material. Appendix K of the enclosed DG-0005 provides model criteria for approving research authorizations and may be helpful in preparing your response. In addition, you may wish to correlate the survey frequency for research laboratories to the hazard using a scheme such as that found in Appendix J of DG-0005.**

The RSC has established an authorization system which uses a standard authorization form to maintain control over the use of radioactive material at GTC. Under this system, staff members who are technically qualified by training and experience to use radioactive material in conducting an experiment must apply to the RSC for authorization.

The form requires that SOPs, contingency plans, survey requirements and training verification be addressed. The RSC will require the project to possess appropriate equipment/facilities for the proposed use (i.e., charcoal filtered hood for radioiodinations).

The completed authorization form must be approved by a plurality of members of the RSC. When and if the RSC is satisfied that the radioactive material will be used in accordance with safe operating practices in the described manner, the authorization will be granted for a period not to exceed one year. During this year,

the study director has the responsibility to ensure that all work done is in accordance with the RPP and that all reporting requirements in the authorization are fulfilled. The form with original signatory pages is kept in the Radiation Safety Office and a copy is held by the applicant.

Any authorization may be suspended by consent of a plurality of members of the RSC if for any reason the requirements in the RPP or requirements in the authorization form are not being followed, or if practices are deemed to be potentially hazardous to the workers, environment, or property. The chairman of the RSC will notify the study director of the decision on behalf of the RSC, in memorandum form, with all evidence to substantiate the decision and any corrective actions necessary to lift the suspension. The study director is responsible for ensuring that no work is done with radioactive materials under the authorization in question until the concerns of the RSC are addressed and changes are implemented. The study director must prepare a report detailing the problems identified and actions taken to correct them and send it to the Radiation Safety Office within ten working days of the initial notification from the RSC.

When the one year period of authorization has ended, the Radiation Safety Office will notify the study director in writing of the termination of the project. Information regarding the need to extend, the status of the radioactive material and a new project completion date will be requested. Based on this information, the RSO will either extend the authorization for an additional period not to exceed one year or terminate the authorization.

14. Please submit a copy of the emergency procedures you will follow in case of spills or other types of accidents involving licensed materials. It is recommended that such procedures contain:

a. instructions to be followed during minor spills,

b. instructions to be followed during major spills, and

c. confirm that your radiation protection officer's name, his office phone number, and a phone number to be used during off-duty hours will be specified on the procedures posted at your facility.

GTC's emergency procedures are contained in Attachment 5.

15. Please provide a copy of your laboratory instructions. Typical instructions should include:

a. **Wear laboratory coats or other protective clothing at all times in areas where licensed materials are used.**

b. **Wear disposable gloves at all times while handling licensed materials.**

c. **Either after each procedure or before leaving the area, monitor your hands for contamination in low-background area,**

d. **Do not eat, drink, smoke or apply cosmetics in any area where licensed material is stored or used.**

e. **Do not store food, drink or personal effects in areas where licensed material is stored or used.**

f. **Wear required personnel monitoring devices at all times while in areas where licensed materials are used or stored.**

g. **Dispose of radioactive waste only in designated, labeled and properly shielded receptacles.**

j. **Secure all licensed material when not under the constant surveillance and immediate control of the authorized users.**

GTC's laboratory safety instructions are provided in Attachment 6.

16. **Please submit a copy of the instructions provided to animal caretakers for handling of animals, animal waste carcasses, and cleaning and decontamination of animal cages**

Instructions provided to animal caretakers (Support Technicians) are provided in Attachment 7.

17. **Describe your licensed material inventory, control and accountability program. Your inventory and control system should have the capability to assure that licensed material possession limits are not exceeded and that material is accountable throughout the institution at any given time.**

A summary of GTC's inventory, control and accountability program follows.

All purchases/receipts of radioactive materials are approved by RSO to ensure

facility license limits are not exceeded. These materials are logged in by the RSO and delivered to the approved user. Use and disposition records are maintained by the user with copies of these records provided to the RSO for inventory updates. Typically, activity is removed from the inventory when projects are concluded and stock materials are returned to the sponsor, or when disposal as radioactive waste occurs.

Possession limits are established and checked when the inventory is updated.

18. **10 CFR 33.13 and 33.14 require applicants to establish administrative controls and provisions relating to management review necessary to ensure safe operations. 10 CFR 20.1101(c) requires that the licensee review the radiation protection program content and implementation at least annually. DG-0005 recommends that an audit and appraisal program be part of the management review. Provide the following information regarding the management review program:**

    a. **Describe the senior management oversight of your radiation safety program. Specify the mechanisms that will be used by senior management to ensure that they are aware of the NRC regulations, the provisions of the license, and the compliance status of the institution's licensed program.**

    b. **Confirm that the Radiation Safety Committee performs an audit of the overall radiation safety program, the Radiation Safety Officer performance, and the radiation staff performance at least annually, and that the results of the audit will be reported to senior management.**

    c. **Specify the types and frequencies of audits that will be implemented by the Radiation Safety Officer and staff to determine user compliance with the requirements of the NRC license, your radiation safety program, and the users' Radiation Safety Committee permit. These audits should include such topics as: reviews of users' inventory and survey records, evaluation of users' training through observation and discussion, and performance of independent work area surveys.**

    d. **Specify the types and frequencies of surveys and monitoring that will be performed by the Radiation Safety Officer and staff. Confirm that surveys will include both unrestricted and restricted areas. The survey frequency may be based on a hazard scheme such as that found in Appendix J of DG-0005, and must be performed at least quarterly.**

Annual management review of operations is accomplished through the annual report prepared by the RSO and approved by the RSC.

Senior management depends on the RSC to manage the radiation protection program. The RSO meets with senior management to deliver the annual report and ensure that they are aware of their responsibilities under the regulations, review any changes in regulations, and the compliance of the GTC program.

As part of the annual report to senior management, the RSC audits the radiation protection program and the performance of the RSO and reports the results to senior management.

Audits are performed quarterly by the Radiation Safety Office or member of the RSC. This audit will involve monitoring a single shipment of radioactive materials for an entire study period (in a given quarter) to determine compliance with GTC's radiation protection program. These audits include : a review of users' inventory and survey records, evaluation of users' training through observation and discussion, and performance of independent work area surveys.

When a deficiency is observed, the auditor prepares a report as soon as possible. If an individual is involved, the auditor informs the individual of the deficiency. The originator of the report shall ensure that it clearly identifies any personnel involved, the physical location of the problem, a brief but clear statement of the problem, and if possible, the recommended corrective action. This report shall be sent to the responsible investigator and other persons involved. The responsible investigator must take prompt and timely corrective action. He shall respond in writing to the Radiation Safety Office with a description of the corrective action taken. Results of the audits and follow-up actions are retained in the Radiation Safety Office.

The RSO and/or staff will perform monthly surveys and monitoring of controlled and unrestricted areas. The surveys will consist of dose rate measurements, wipe testing for removable contamination, and direct contamination measurements.

19. **Provide a complete description of the routine survey program, including the areas to be surveyed, the types and levels of radiation and contamination considered to be acceptable, and provisions for maintaining records of surveys. The individual user should supplement the surveys performed by the radiation staff. Regularly used laboratories should be surveyed for contamination at the end of each workday (except when quantities less than those in Appendix C to 10 CFR Part 20 are handled by an employee at any one time), and the user should maintain records of each surveys in units required**

by 10 CFR Part 20, even if only a single measurement is necessary.

The following table shows the frequency required for wipe testing areas depending upon the isotope and quantity used.

Wipe Test Frequency of Laboratory*, Work and Storage Areas

Types of Radionuclides	Level Required for Weekly Wipe Testing	Level Required for Monthly Wipe Testing
Alpha emitters	10 μCi < x < 20 mCi	1 μCi < x < 10 μCi
Low Risk Beta and Gamma emitters**	1 mCi < x < 20 mCi	0.1 mCi < x < 1 mCi
Beta and Gamma emitters	1 mCi < x < 20 mCi	100 μCi < x < 1 mCi
Tritium (H-3)	x > 10 mCi	10 μCi < x < 10 mCi

* Wipe test frequencies are based on the isotope and total quantity used, processed, or stored in a refrigerator or cabinet in any one month period.
** Low risk beta or gamma emitters include S-35, Tc-99m and others whose maximum beta energies are less than 0.2 Mev and gamma emissions are less than 100 mrem/hr measured at 1 meter or 1 Curie and whose permissible concentration in air is greater than 1E-6 μCi/cc.

To assist workers in determining cleanup levels for radioactive contamination, the RSC has adopted Contamination Action Limits (CALs) as shown below, which are "trigger" levels requiring cleanup. When contamination is found, even if it is below the CALs, it is GTC's policy to attempt to decontaminate all affected areas.

Contamination Action Limits (CALs, in dpm/100 cm^2) for both Removable and Fixed Contamination

	Removable	Fixed	Alpha Emitter	Beta/Gamma Emitter*	Low Risk Beta Emitter
Sealed Sources	X		10,000	10,000	10,000
Package wipe testing	X		200	2,200	2,200
Equipment and items released to:					
Restricted Areas**	X		20	200	200
		X	100	5,000	5,000
Unrestricted Areas***	X		15	100	100
		X	50	1,000	1,000
Area Wipe Tests					
Restricted Areas	X		220	2,200	22,000
		X	1,100	10,100	10,100
Controlled Areas	X		2,200	220	2,200
(laboratories)		X	220	2,200	2,200
Protective Clothing					
Restricted Areas	X		220	2200	22,000
		X	220	2200	22,000

* All beta or gamma emitters are not considered to have low risk. Low risk beta or gamma emitters include C-14, H-3, S-35, Tc-99m, and others whose maximum beta energies are less than 0.2 Mev and gamma emission are less than 100 mrem/hr measured at 1 meter for 1 curie and whose permissible concentration in air is greater than $1X10^{-6}$ Ci/cc.

** Restricted Areas - laboratories and areas where radioactive materials are used and/or stored.

*** Unrestricted Areas- offices and other areas where untrained personnel work.

Taken from: 10 CFR 20, 10 CFR 71, and 49 CFR 173

20. Specify the action limits for radiation and contamination surveys and the actions to be taken when these limits are exceeded. The action limits should be in appropriate units.

The action limits are specified in response to question 19. Any contamination found above these limits will be decontaminated to the greatest extent practicable.

21. Specify the criteria used to assign personnel monitoring devices (e.g., film/TLD whole body and extremity badges), state the device processing frequency for the various laboratory types, and your dosimetry system processor who is required to be NVLAP approved. If direct reading dosimeters will be used, specify the calibration frequency and method.

Radiation workers who handle radioisotopes capable of being detected by a film badge dosimeter or are routinely present in areas where such radioisotopes are used or stored will be required to wear a whole body film badge dosimeter. This will include the scientific and research staff and ancillary personnel such as glass washers and maintenance persons. Employees who do not frequent the radiation laboratories such as secretarial help will not be issued a film badge unless they personally request one.

Persons who handle millicurie quantities of hard beta and/or gamma ray emitting radioisotopes will be required to wear ring/wrist dosimeters as well as whole body badges.

Dosimeters will be supplied by ICN Dosimetry Service and will have a monthly replacement frequency. Records of personnel exposures will be maintained by the Radiation Safety Officer.

22. **10 CFR 20.1201 requires, in part, that skin dose be limited to 50 rems per year. 10 CFR 20.2203(b) requires, in part, that each report filed in response to a reportable event include an estimate of each individual's dose, The NRC has observed that programs of your scope have experienced skin contamination incidents. Describe your procedures for assessing dose from skin contamination with licensed material.**

All radiation workers are instructed to perform personal monitoring of themselves during and after all work with unsealed radioactivity. In the event that positive results are detected during monitoring, the worker will notify the RSO immediately and begin decontamination procedures.

The positive results of the monitoring (typically performed with a pancake style GM detector) will be recorded in units of counts per minute. The RSO will verify the measurement results with an appropriately calibrated instrument for the isotope in use. These results will be used to determine the level of radioactivity remaining in the skin surface. This activity result will be converted to a dose result in rems by either calculation or use of the computer code Varskin.

We will use our consultant, Mitchel S. Galanek of MIT to assist us in determining the dose to any contaminated worker.

23. **Describe your procedures for complying with Sections 20.1203, 20.1204, and 20.1302 of 10 CFR Part 20, for procedures such as protein iodinations and tritium labeling experiments that may release volatile or gaseous radioactive**

materials to restricted and unrestricted areas. You should include a description of the type of surveys (e.g., environmental or breathing zone), frequency of surveys, and the individuals who will perform the surveys (e.g., radiation safety officer or investigator), equipment to be used, and the procedures for evaluating the results.

The RSO will be responsible for monitoring airborne levels of radioiodine to show compliance with applicable Part 20 regulations. The monitoring will include both environmental samples and worker breathing zone samples. Samples will be collected on activated carbon filters. The environmental sample will be collected at the rate of 10 liters per minute from the effluent stream being released from the laboratory stack. The breathing zone sample will be collected on an activated charcoal filter at a rate of 2 liters per minute. The filter holder is located at the face of the iodination hood. The collection filters will be analyzed in our gamma scintillation counter, the results will be converted to an activity concentration in microcuries per milliliter of air and these results compared to the allowable concentrations found in 10 CFR Part 20, Appendix B.

Sampling will be done during each iodination and the results maintained by the RSO. If the results indicate a problem with compliance with the allowed emission levels found in Appendix B, engineering controls will be put into effect to reduce the levels of radioiodine released from the facility.

Currently, no other procedures using radioisotopes produce volatile/gaseous releases. If this changes, the RSC will require the appropriate monitoring to assess environmental releases or potential worker exposures.

24. **Describe your bioassay program, including the type of bioassay (thyroid counts, urine counts, whole body counts, etc), the criteria and the frequency for performing bioassays, and the type of action taken when positive results are obtained. It is recommended that bioassay procedures be considered for personnel using millicurie quantities of tritiated organic compounds, iodine-131, and iodine-125 in noncontained forms.**

Radiation workers who handle tritium in quantities of 5 millicuries or greater will be required to submit a urine specimen to the RSO within 24-48 hours after handling the radioisotope. Specimens will be analyzed by liquid scintillation counting in an appropriately calibrated analyzer. Action levels as well as corrective actions taken will be those outlined in Item 5, Regulatory Guide 8.32.

Bioassays may be performed on designated individuals at the discretion of the RSO in cases of accidental widespread contamination. Workers handling ^{35}S labeled

compounds will submit bioassay samples if survey data indicate contamination problems arising from certain compounds or procedures. Records of bioassay results will be maintained as required by 10CFR 20.2106.

Persons working with unbound radioiodine will check their thyroid before begining the procedure and the 24 to 48 hours after the procedure.

Radiation workers handling protein bound radioiodine will not be required to have thyroid burden measurements. Thyroid monitoring may be performed on designated individuals (e.g., personnel performig radioiodination procedures) at the discretion of the RSO or if survey data indicates contamination problems arising from specific procedures. The measurements will be made 'in-house' using a hand held portable NaI detector that is calibrated for thyroid burden measurements by using an ^{125}I standard in a neck phantom. Any positive result, in excess of 10% above the annual limit of intake (ALI) will be verified by our radiation protection consultants, and require investigation by the RSO and additional controls will be put into place to eliminate any further intakes. Records of all thyroid burden measurements will be maintained as required by 10CFR 20.2106.

25. Provide your procedures for disposal of licensed radioactive waste by decay-in-storage. Your procedures must provide assurance that you will:

a. hold the radioactive waste in storage for at least 10 half-lives,

b. survey the waste in a low background area with a low-level survey meter with all the shielding removed,

c. not dispose of the waste as normal trash unless the radiation level is at background,

d. remove or deface the radioactive material labels or otherwise indicate that containers no longer hold radioactive materials, and

e. you will maintain records of these waste disposal surveys.

"Guidance to Licensees Regarding Requests to Dispose of Radioactive Waste by Decay-In-Storage" (enclosed) may be helpful in preparing your response.

Waste which will be stored for decay, is logged into isotope specific fiberboard drums. Among the information required is the date and activity. The log sheet provides for the estimation of the disposal date (10 half-lives) to be entered. Drums are currently stored in a secure area in the basement. After 10 half-lives have

elapsed, the drums are opened and the contents surveyed. Providing the radiation is at background, as measured by a standard GM survey meter set at the most sensitive setting, all radiation labels, if present, are removed and the material discarded into the general solid waste stream. The log sheet, including the survey results, is completed with the date of disposal and retained with other records.

26. **In order for the NRC to authorize you to dispose of licensed materials by incineration, you must submit evidence that all state and local regulations concerning incineration of radioactive material have been met by your institution.**

See Attachment 8 for a copy of the State of Massachusetts permit to operate an incinerator.

27. **10 CFR 20.2003(a)(1) requires that a licensee may discharge licensed material into sanitary sewerage if the material is readily soluble (or is readily dispersible biological material). Information Notice 94-07 (enclosed) provides methods for determining compliance with this requirement which are acceptable to the NRC.**

Please review this Information Notice and provide specific information as to how you will assure that your releases to the sanitary sewerage system will meet the solubility criteria in 10 CFR 20.2003(a)(1). If you wish, you may indicate that you will use one of the methods described in Information Notice 94-07. Otherwise, describe your alternative methodology including the models, calculations, analytical techniques, and quality control measurements as well as the records that will be maintained.

In addition, provide calculations to show compliance with 10 CFR 20.2003(a)(2)(3)(4) and confirm that records will be maintained of all disposals made into the sanitary sewage system.

The CRC Handbook of Chemistry and Physics, manufacturers information from technical data sheets, material safety data sheets or other sources will be consulted to determine if the solubility criteria are met.

Sample calculations for allowable daily limit based on concentration from Table 3 Appendix B Part 20.

Hydrogen-3:
0.01 μCi/ml X 1000 ml/l X 18,927 l/day X 10% ALARA ÷ 4 sinks = 4731 μCi/sink/day

Carbon-14
0.0003 μCi/ml X 1000 ml/l X 18,927 l/day X 10% ALARA ÷ 4 sinks = 142 μCi/sink/day

Calculations will be done in a similar manner for other isotopes.

If more that one nuclide is disposed then:
(Average Monthly Concentration each nuclide) ÷ (Concentration in Table 3 Appendix B Part 20) = X
X's for all nuclides are added to ensure they are below unity as required by 20.2003(a)(3).

Record of sanitary sewer disposal are maintained at the sink where disposal occurs. The date, isotope and activity are logged. The logs are reviewed by the RSO.

28. Confirm that you will maintain records of the following activities:

a. radiation safety training, Including initial and retraining, list of topics covered, the amount of time spent, the date(s), and the instructor(s) and student(s) names.

b. Radiation Safety Committee meeting minutes, including review and approval of authorized users and uses of licensed material

c results of audits performed by the Radiation Safety Committee

d. results of audits and surveys perfc med by the Radiation Safety Officer and staff

e. decay-in-storage waste records, including the date licensed material Is placed into storage, and the date and results of surveys performed when disposed

f. receipt and transfer of licensed material

g. licensed material inventory

h. calibration of radiation monitoring instruments and equipment

Records of the following events will be maintained

1. training, including initial and retraining, including a list of topics covered, the amount of time spent, the date(s), and the designated trainers and employees names.

2. Radiation Safety Committee meeting minutes, including review and approval of authorized users and uses of licensed material

3 results of audits performed by the Radiation Safety Committee

4. results of audits and surveys performed by the Radiation Safety Officer and staff

5. decay-in-storage waste records, including the date licensed material Is placed into storage, and the date and results of surveys performed when disposed

6. receipt and transfer of licensed material

7. licensed material inventory

8. calibration of radiation monitoring instruments and equipment

29. Describe how you will preclude the unauthorized removal of licensed material from the place of storage and in restricted and unrestricted areas, as required by 10 CFR 20.1801 and 20.1802.

To prevent unauthorized removal of material, all "stock" materials are stored in locked cabinets, refrigerators or freezers. Access to all buildings in the GTC group is restricted by card-key access.

30. Your application should have been signed by a management representative rather than the Radiation Safety Officer. Please submit a letter signed by a management representative indicating that management has reviewed the application and concurs in the statements and representations contained therein. Note also that a management representative should sign all future correspondence which request change in your license.

As indicated in the cover letter with this submission, GTC management has reviewed the application to the NRC and concurs with the statements and

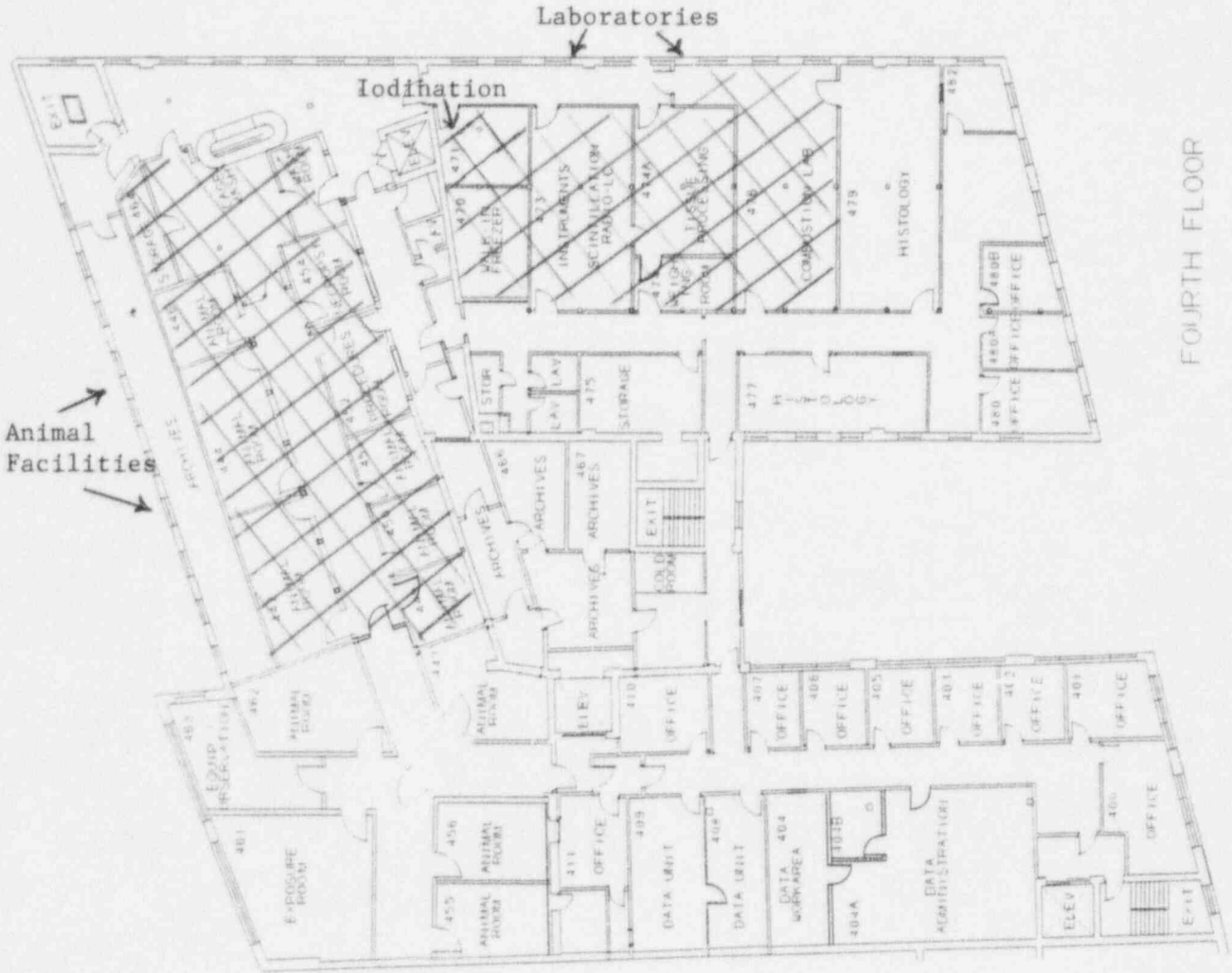
representations contained therin.

All future correspondence requesting a change in the license will be signed by a management representative.

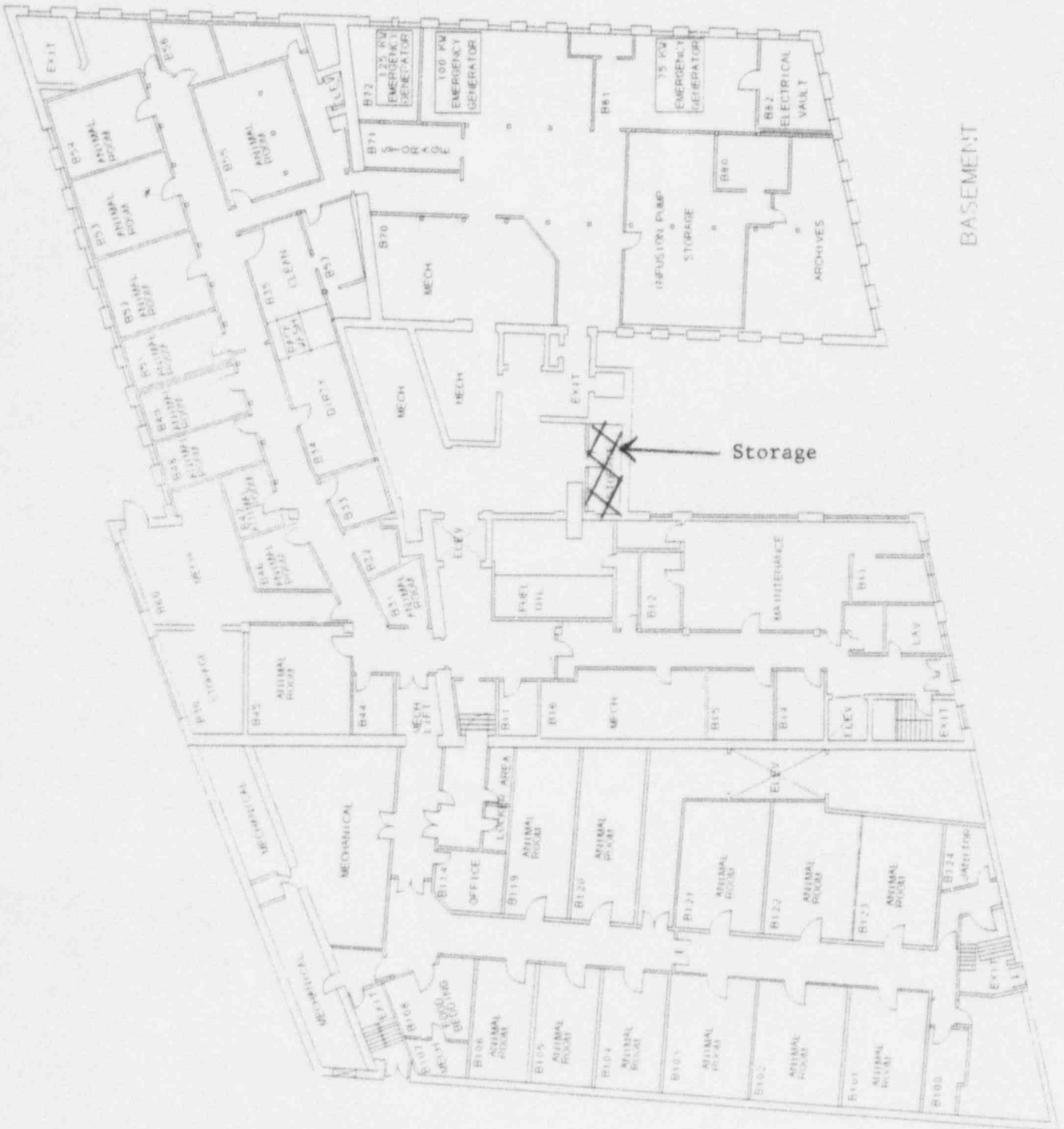
ATTACHMENT 1

FLOOR PLANS

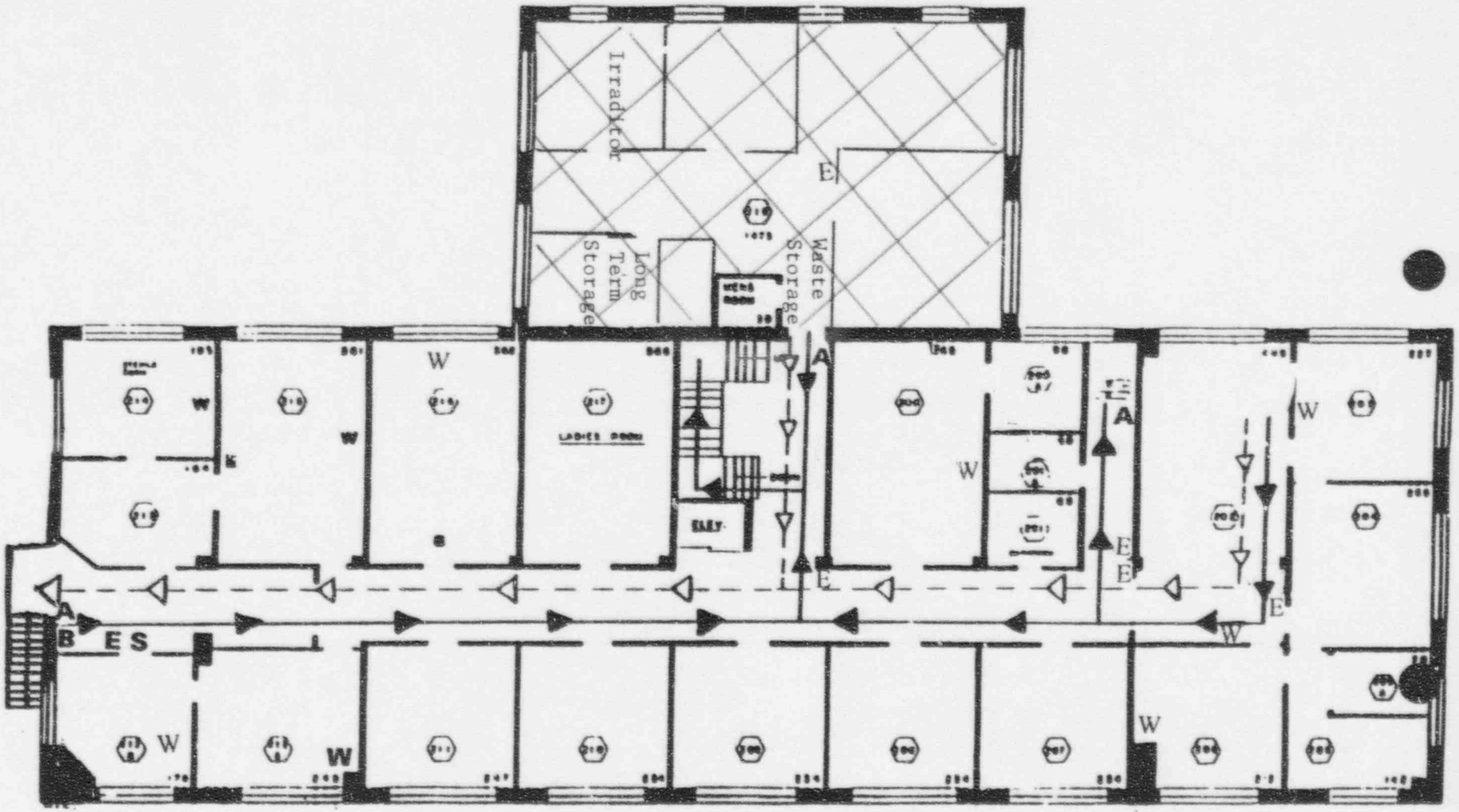
TSI Mason Laboratories



(a) CORRESPONDING FLOOR SPACE IN ADJACENT BUILDING ON THIS LEVEL


BASEMENT
Storage
125 KW EMERGENCY GENERATOR
100 KW EMERGENCY GENERATOR
75 KW EMERGENCY GENERATOR
ELECTRICAL VAULT
STORAGE
MECH
INFUSION PUMP STORAGE
ARCHIVES
EXIT
DIRTY
CLEAN
MAINTENANCE
ELEV
OFFICE
MECHANICAL
ANIMAL ROOM

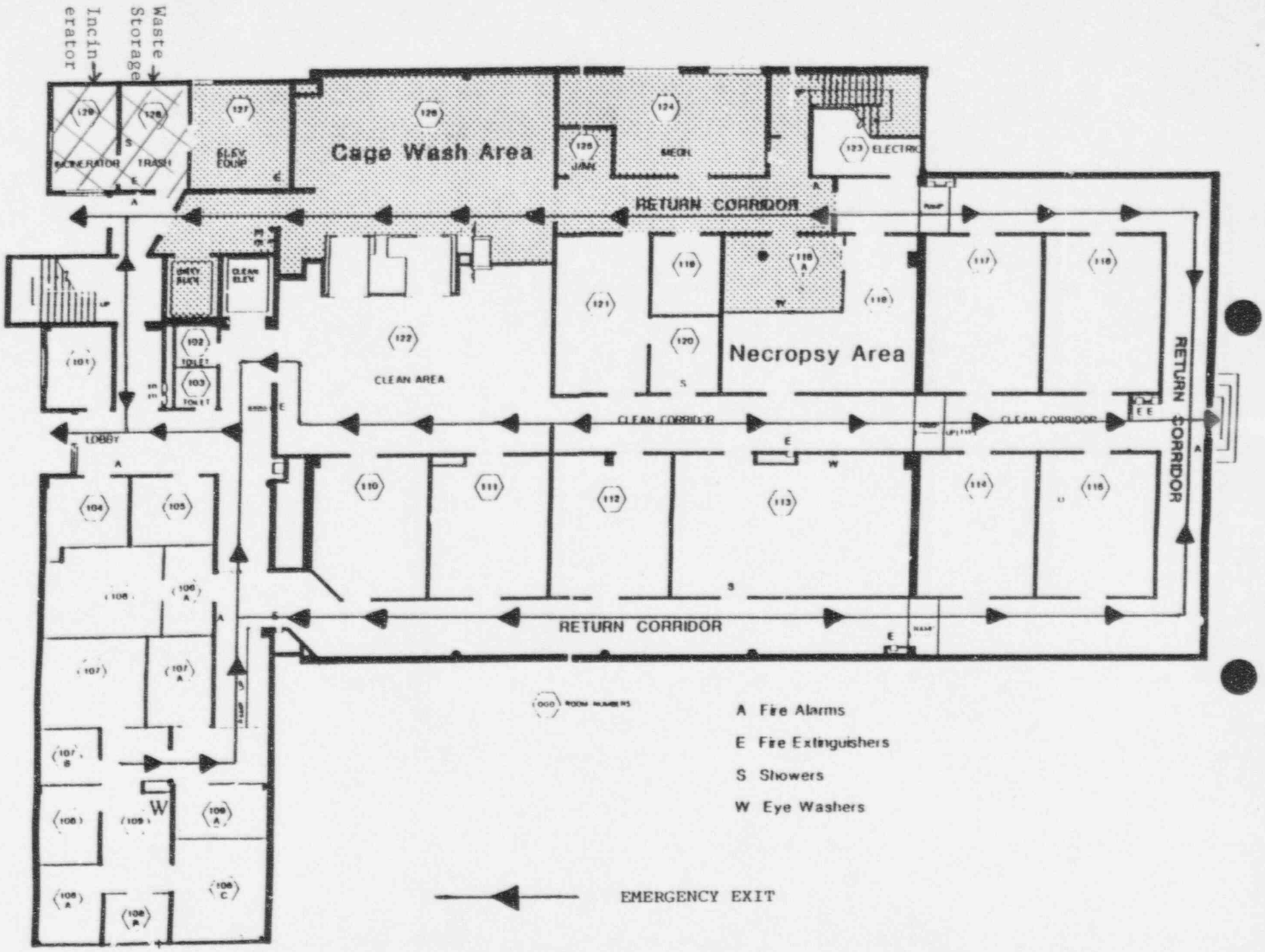
Second Floor of Memorial Drive, Emergency Exit Evacuation Plan



NORMAL EMERGENCY EXIT

ALTERNATE EMERGENCY EXIT

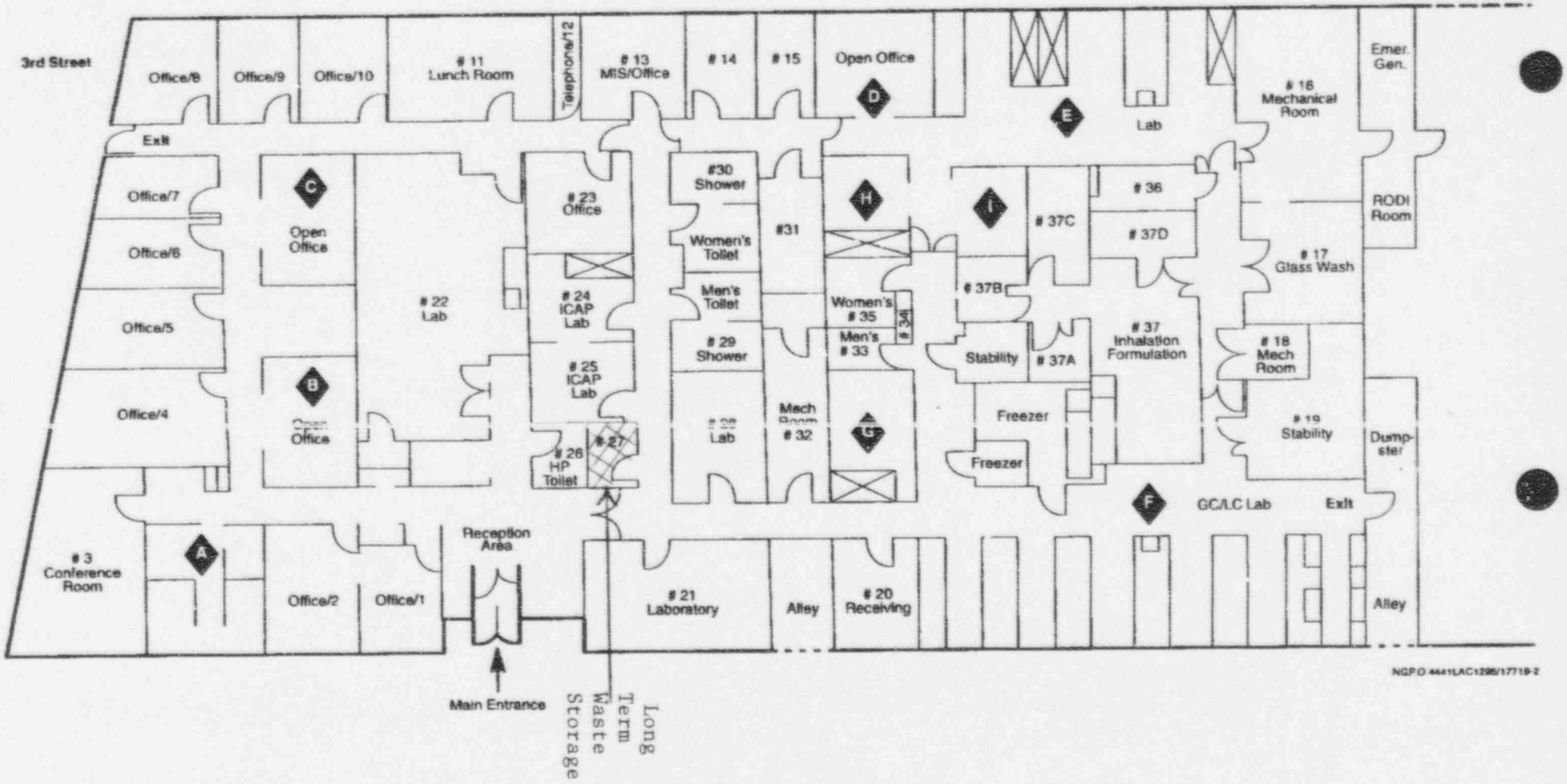
E Fire Extinguishers
S Showers
W Eye Washers



First Floor of 134 Main Street, Emergency Exit Evacuation Plan

BIODEVELOPMENT Laboratories, Inc.

83 Rogers Street
Cambridge Massachusetts 02139

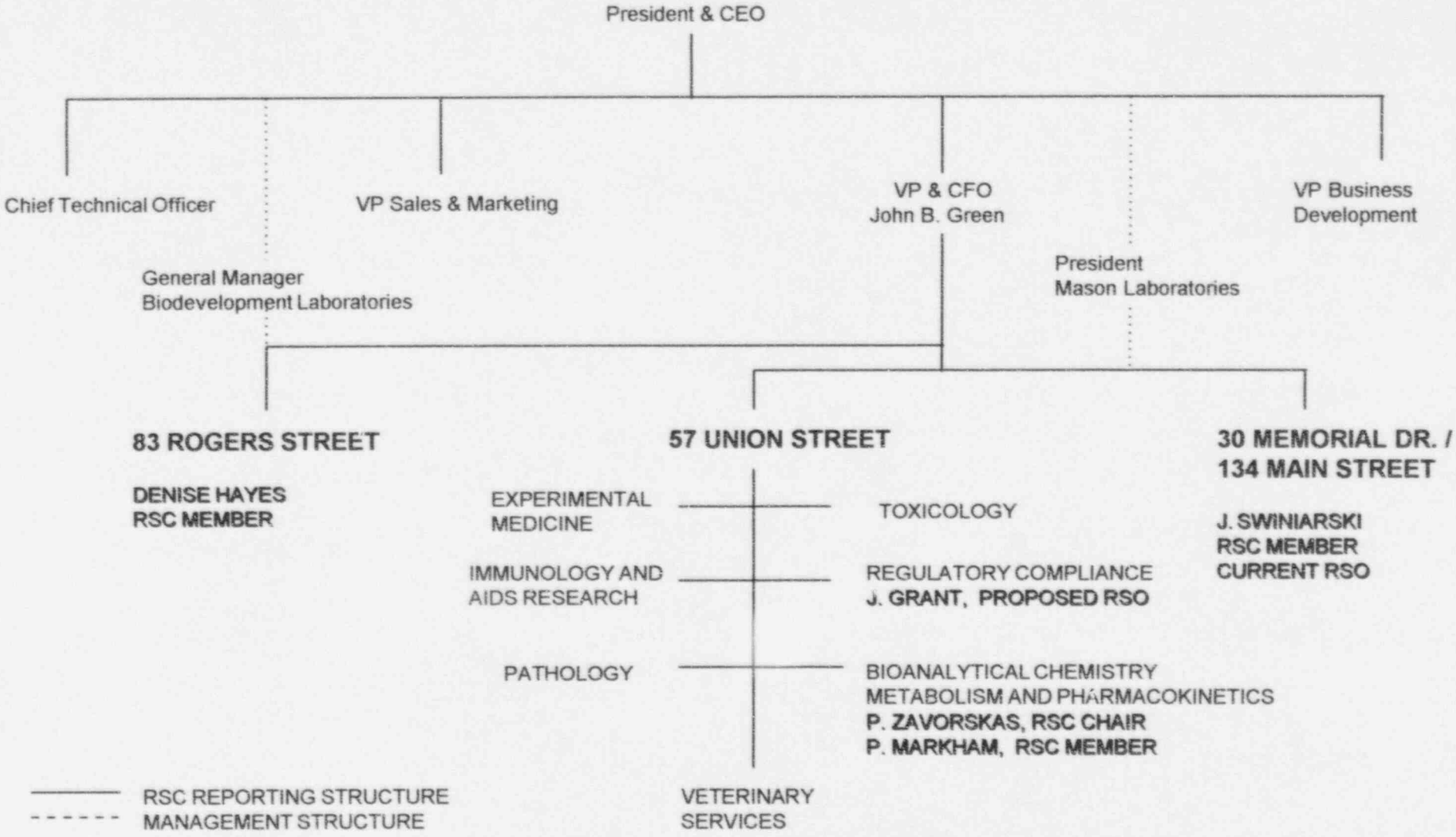


NGP.O 4441LAC1295/17719-2

ATTACHMENT 2

ORG CHART

Organizational Chart - Genzyme Transgenics Corporation
(Divisions covered by NRC License 20-01489-01 (extended)



ATTACHMENT 3

RADIATION SAFETY OFFICER CERTIFICATION

The management of Genzyme Transgenics Corporation delegates to the Radiation Safety Officer the following authorities:

- to communicate with and direct personnel regarding the NRC regulations and license provisions
- to enforce the regulatory and license requirements, including the ability to terminate any unsafe operation involving the use of licensed material

Management will also provide for:

- sufficient time to perform the duties of the RSO
- sufficient resources to accomplish these tasks

The RSO has, and will continue to receive, the support of the management of this license in ensuring that all licensed activities will be conducted in accordance with NRC regulations and the specific terms of the license.

Corporate Officer Approval

John B Green

John Green
Vice President & CFO
Genzyme Transgenics Corporation
25 Birch Street
Milford, MA 01757

ATTACHMENT 4

RSC Chair Credentials

TSI Mason Laboratories

Paul A. Zavorskas

Education:

University of Massachusetts, Amherst, MA; B.S., Microbiology, 1974, Phi Beta Kappa

Anna Maria College, Paxton MA; M.A., Biology, 1984

Professional Experience:

1991-Present	Associate Scientist/Study Director, Department of Metabolism and Pharmacokinetics, TSI Mason Research Institute, Worcester, MA
1990-1991	Associate Scientist/Study Director, Department of Laboratory Services, TSI Mason Research Institute, Worcester, MA
1988-1990	Research Associate, Laboratory of Immunology and Development, EG&G Mason research Institute, Worcester, MA
1986-1988	Laboratory Manager, Laboratory of Immunology and Clinical Services, EG&G Mason Research Institute, Worcester, MA
1979-1986	Laboratory Supervisor, Laboratory of Immunology and Clinical Services, EG&G Mason Research Institute, Worcester, MA
1976-1979	Laboratory Technician, Department of Immunology, EG&G Mason Research Institute, Worcester, MA

Radioisotope Training and Duties:

1976-1990	On-the-job training (EG&G Mason Research Institute under Henry J. Esber, Ph.D., Radiation Safety Officer)
1980-1991	Member of Radiation Safety Committee
1983-1991	In-house training (Education and training seminars conducted by radiochemistry consultants Bolton & Galanek, 3-4 times annually)
1982-1991	Compile and maintain radioisotope inventory and radiation safety and training records for Institute
1983	4-day in-house training session by consultant Murray Bolton
1990-1991	Chairperson of Radiation Safety Committee
1991-1996	Radiation Safety Officer

Radioisotope Experience:

Years	Isotope	Total Activity	Type of Use
1976-1996	^{125}I	250 mCi	RIA, protein iodination
1990-1996	^{131}I	10 mCi	RIA, protein iodination
1983-1996	^{125}I	100 mCi	In vivo distribution and clearance studies-rodent and primate
1976-1996	^{3}H	100 mCi	RIA, in vivo distribution and clearance studies-rodent and primate
1985-1996	^{14}C	200 mCi	In vivo distribution and clearance studies-rodent, canine, primate
1987-1996	^{99m}Tc	800 mCi	In vivo tumor imaging with ^{99m}Tc-labelled antibodies
1988-1996	^{51}Cr	50 mCi	In vivo survival of ^{51}Cr labelled RBCs-rodent, primate
1989-1991	^{32}P, ^{35}S	2 mCi each	In situ hybridization, nucleotide labelling
1990-1991	^{46}Sc, ^{95}Nb ^{103}Ru, ^{113}Sn ^{141}Ce	500 μCi each	Use of labelled microspheres to study cardiac ischemic injury in vivo
1992	^{90}Y	100 mCi	In vivo distribution and clearance studies-rodent
1993-1995	^{153}Gd	2 mCi	In vivo distribution and clearance, and imaging studies-primate
1994-1996	^{131}I	20 mCi	In vivo distribution and clearance studies-primate

Emergency Procedures

1 Emergency Procedures

1.1 Loss or Theft of Radioactive Materials

Specific actions and notifications must be performed immediately when the RSO or a staff member realizes that licensed material is lost or stolen. If a staff member realizes that a licensed material is missing, he or she must immediately report to the RSO the isotope, quantity, radiolabeled substances, and probable reasons for its disappearance. Per 10 CFR 20, the RSO will notify the NRC, State Department of Public Health and other agencies (if required) depending on the nature of the radiolabeled substances, once reasonable efforts to locate the material has failed.

1.2 Fires, Explosions or Major Emergencies

1. Notify all other persons in the area to leave at once.
2. Call 911 to notify the fire department and 312 at Union Street and 1499 at Rogers Street to notify GTC safety personnel. Give them the location of the fire.
3. Upon their arrival, inform firefighters of the current location of radioactive materials, where they are stored and where they were being used; advise them of the best entrance route to the emergency area and give any precautions to avoid exposure or risk of creating radioactive contamination (i.e., use of high pressure water, etc.). The RSO will coordinate further activities upon arrival.

1.3 Minor Fires

1. Attempt to put fires out by approved means, if fire safety or radiation hazards are not immediately present.
2. Call 911 to notify the fire department and 312 at Union Street and 1499 at Rogers Street to notify GTC safety personnel. Give them the location of the fire.
3. Avoid, if possible, the tracking of contamination or the passing of contaminated equipment into clean areas by emergency workers.
4. Prepare a complete account of the emergency and subsequent related actions to be submitted to the RSO within ten working days of the incident.

1.4 Accidents Involving Possible External Radiation Overexposure

1. If a high activity sealed source has been dislodged or is stuck in an unshielded position, do not attempt to remedy the situation.
2. Remove personnel involved from the radiological operations area immediately and secure the facility.

3. Notify the RSO immediately.
4. Have exposed individuals examined as soon as possible by a physician.
5. Obtain and record all details of the incident to submit to the RSO upon his/her arrival.
6. The personnel involved should complete a statement of facts on how exposure occurred and send it to the RSO as soon as possible after the incident.

1.5 Procedures for Radioactive Spills

Major Spills

1. Notify personnel not involved with the spill to vacate the room immediately. Limit the movement of displaced persons to confine the spread of contamination until they can be monitored. Call 911 to notify the fire department and 312 at Union Street and 1499 at Rogers Street to notify GTC safety personnel. Give them the location of the spill.
2. If hands are protected and the spill is liquid, right the container; if hands are not protected, use long tongs.
3. If the spill is on the skin, immediately flush thoroughly with warm soapy water and monitor.
4. If the spill is on clothing, discard outer or protective clothing at once, monitor and decontaminate if necessary.
5. Turn off fans to try to avoid creating airborne contamination.
6. Vacate the room but take care not to track or spread contamination.
7. All persons involved in the spill and cleaning will be monitored.
8. The personnel involved should record all details of the accident and subsequent actions must be submitted to the RSO within ten working days of the incident.

Minor Spills

1. Notify personnel not involved with the spill to vacate the room immediately. Limit the movement of displaced persons to confine the spread of contamination until they can be monitored.
2. All persons involved in the spill and cleaning will be monitored for contamination before they become dispersed and decontamination is done as necessary.
3. Permit only the minimum number of persons necessary to deal with the spill into the area.
    - Liquid spills
        - don protective gloves
        - drop absorbent material on spill
    - Dry spills
        - don protective gloves
        - taking care not to spread contamination, dampen dry spill thoroughly using water (if chemical reaction with the water could generate an air contaminant, oil should be used instead)

4. The personnel involved should record all details of the accident and subsequent actions which must then be forwarded to the RSO, along with wipe test and monitoring records to verify clean up within ten working days of the incident.

1.6 Accidents Involving Radioactive Dusts, Mists, Fumes, Organic Vapors, and Gases

1. Notify all other personnel to vacate the room immediately.
2. Quickly close air vents and hood.
3. Vacate the room. Seal off the area if possible.
4. Notify the RSO.
5. Confirm that all doors giving access to the room are closed. Post guards or conspicuous warnings to prevent accidental opening of the doors.
6. Report all known or suspected ingestion or inhalations of radioactive materials at once to the RSO.
7. All personnel directly involved should have a thorough medical exam and possibly a whole body gamma count performed as recommended by the RSO and physician before returning to radiation work.
8. A complete history of the accident and subsequent actions must be submitted to the RSO within ten working days of the incident along with wipe tests and monitoring records to verify clean up.

1.7 Injuries to Personnel, Involving Radiation Hazard

1. Wash minor wounds immediately under running water. If at all practical collect and retain cotton sponges, fluids, etc. for analysis.
2. Report all radiation accidents involving personnel wounds, suspected over-exposure, ingestion, inhalation to the RSO as soon as possible by dialing 312 or calling 508-791-0931 from Rogers Street.
3. The RSO will immediately call a physician qualified to treat radiation injuries and to collect additional bioassay samples if necessary.
4. Permit no person with a radiation injury to return to work without the prior approval of the RSO and the qualified physician.
5. A complete history of the accident and subsequent actions must be submitted to the RSO within ten working days of the incident.

1.8 Shipping and Receiving Emergency Procedures

1. All shipments of radioactive material must be stored in a secured area to await pick up.
2. If loss or theft of a package containing radioactive material occurs, the RSO and person for whom the shipment is intended must be notified immediately.
3. If a fire occurs in an area where radioactive materials are awaiting pickup, dial 312

at Union Street and 508-791-0931 at Rogers Street or Memorial Drive.

4. Attempts to extinguish small fires may be performed provided the packages containing radioactive material have not been harmed.
5. Crushed packages containing radioactive material must be reported to the RSO immediately. The area where the package was crushed should be evacuated, secured, and barriers posted to prevent entry and spreading of contamination.

General Laboratory Safety Practices

Each employee is responsible for observing all of the following general laboratory safety practices when using licensed radioactive material in any of the company laboratories:

- only authorized persons are allowed in areas designated for radioactive material use;
- absolutely *NO* eating, drinking, smoking or cosmetics application is permitted in any work area;
- absolutely *NO* food or drink is to be stored in refrigerators, freezers, or laboratories where radioactive materials are stored or used;
- mouth pipetting is strictly prohibited;
- eye protection should be used while working in the laboratory area;
- buttoned laboratory coats or disposable clothing shall be worn in all areas designated for radioactive material use;
- under no circumstances shall laboratory clothing be worn outside areas designated for radioactive material use;
- gloves that provide a protective barrier shall be used when weighing, handling, or injecting radioactive materials, handling treated animals, or cleaning cages; these gloves should be changed every two hours, or immediately upon known contamination;
- hands shall be thoroughly washed at the end of each work period;
- when issued, personal monitoring devices (i.e., film badges and/or pocket dosimeters) shall be worn;
- all wounds, spills, or emergencies shall be immediately reported to the Radiation Safety Office and emergency procedures found in Section 16 of this guide shall be followed; and
- all records of radioactive material use should be completed before leaving the laboratory at the end of the work period.
- all persons who work with radioactive materials will thoroughly survey their hands and clothing for contamination before leaving the laboratory.

ATTACHMENT 7

Instructions Provided to Support Technicians

1 Procedures Required For In Vivo Experiments Involving Radioactive Material

1.1 Animals shall be treated with radioactive material and housed or sacrificed only in a room that is specifically approved for such purpose by the Radiation Safety Officer.

1.2 Clearly identify cages housing "radioactive" animals with a (magenta on yellow) "Caution Radioactive Material" label or sign on which is specified the following information:

- Radionuclide
- Amount of radionuclide, and date

1.3 Equip cages housing "radioactive" animals with appropriate containment (such as filter covers, etc.) which will prevent displacement from the cages of contaminated excreta, bedding, or nutrients when they are housed in close proximity to other, "nonradioactive", animals.

1.4 Should there be a possibility of the release of airborne radioactive contamination during animal treatment, housing or sacrifice, an approved hood or ventilated enclosure shall be used. The procedures for airborne contamination control must be approved by the RSO prior to conduct of the proposed work.

1.5 Put all radioactive solid and liquid waste (except as per items 2.6 and 2.7) into appropriate containers. A record of the isotope and estimated activity, etc., shall be maintained.

1.6 All radioactive water soluble or dispersible material which may be discarded into the drain shall be clearly labeled (nuclide, activity, study number, date and technician) and taken to the MAP laboratory for disposal in an approved sink.

1.7 Animals shall be sacrificed such that all potentially radioactive tissues and body fluids are collected and stored as radioactive materials for further analysis or disposed of as radioactive waste. If they are to be disposed of, carcasses and tissues shall be packaged and stored frozen for decay.

1.8 Animal carcasses containing 0.05 μCi or less of tritium (^{3}H) or carbon-14 (^{14}C) per gram of tissue averaged over the weight of the entire animal may be disposed of without regard to their radioactivity. This waste shall be disposed of by incineration with other non-radioactive animal carcasses.

1.9 The cleaning of cages used to house animals containing radioactive material shall be done as follows:

- Survey the bedding to determine the contaminated areas. Any areas reading above 2 times background is considered contaminated.
- Remove those areas identified as radioactive to the radioactive waste container and place the remainder in the waste bedding container.

1.10 Potentially contaminated cages will be surveyed for residual contamination (> 2000 counts/minute), decontaminated as necessary, before being washed in the cage/rack washer.

1.11 Treat any radioactive waste that contains potentially bio-hazardous material to make the material harmless prior to its disposal as radioactive waste. Consult the RSO or Health & Safety Officer for materials contaminated with radioactive and carcinogenic materials.

1.12 Survey rooms where radioactive animals are housed routinely (i.e., once per week). For experiments of short duration (less than a few days), the room will be wipe test surveyed at the completion of the experiment.

2 Specific Rules for ^{32}P:

2.1 Persons handling millicurie quantities of ^{32}P will use low density shielding (Plexiglas) to minimize bremmstrahlung radiation production.

2.2 Wear safety glasses or similar protective devices when handling millicurie quantities of ^{32}P to keep beta exposures to the lens of the eye to a minimum.

2.3 Thoroughly survey the work area after each use of ^{32}P.

2.4 Use the GM detector when surveying for ^{32}P contamination.

2.5 Perform a dry run prior to any new procedures to preclude unexpected complications.

2.6 Wear whole body film badges and finger ring badges when handling millicurie quantities.

2.7 Persons working with ^{125}I will use appropriate lead shielding and/or leaded acrylic shielding to minimize external exposures as necessary.

2.8 Perform a dry run prior to any new procedures to preclude unexpected complications.

2.9 Wear whole body and ring/wrist badge dosimeters when handling millicurie quantities of ^{125}I.

2.10 Thoroughly survey the work area after each use of ^{125}I.

2.11 Use the NaI scintillation detector when monitoring for ^{125}I contamination.

3 Decontamination Procedure:

3.1 Personnel must wear gloves during this procedure. The contaminated area is washed down thoroughly with a 2% solution of an all-isotope decontamination agent. The area is washed, rinsed, dried and re-tested for radioactivity levels until background levels are achieved. Note: the water generated during this procedure is radioactive waste and is handled according to Section 12.

3.2 Survey the suspected area of radioactive contamination on the body with the GM survey meter to determine the specific areas requiring decontamination. Proceed with the following decontamination procedures as necessary.

3.3 General Procedure

- Wet hands and apply mild soap.
- Work up good lather, keep lather wet.
- Work lather into contaminated area by rubbing gently for 3 minutes. Apply water frequently.
- Rinse thoroughly with lukewarm water limiting water to contaminated areas.
- Repeat above procedures as necessary to reach background level.
- Contact the RSO and the Health & Safety Officer.

4 Waste Disposal

Short-lived Radionuclides ($T_{1/2}$ <120 days)

4.1 Solid Waste and Bedding

4.1.1 This waste consists of absorbent paper, gloves, tubing, syringes (without needles), pipette tips, etc., that have been used and become contaminated while handling radioactive material, and bedding.

4.1.2 All solid waste potentially contaminated with radioactive material is monitored to determine if contamination is present and then removed and stored in appropriately labeled waste receptacles.

4.1.3 Waste receptacles will be white metal cans with foot-operated lids. Each container is lined with a two mil plastic bag. Do not use a "red" bag.

4.1.4 A record of the activity (amount) of waste being disposed will be maintained. The initial activity of the test article will be used to estimate the activity of spills. Background radioactivity found during routine surveys will be recorded as less than 1 micro curie (<1 μCi).

4.1.5 When the container is full, it is the responsibility of the study technician to remove the bag, close it off with tape (not radioactive labeling tape), and place it in the appropriate fiberboard drum in the basement radioactive waste storage area. If the waste will not be immediately taken to the basement, label it with isotope, date, study number and technician initials and incorporate a "radioactive" sticker.

4.1.6 The log sheet next to the disposal drum (40 gal. fiberboard drum) will be completed with date, isotope, type of waste and technician initials.

4.2 Mixed Waste

4.2.1 Mixed waste is material which presents both radioactive and biological hazards. Biological hazards are presented by contaminated items that would release blood or other potentially infectious materials in a liquid or semi-liquid state if compressed, items that are caked with dried blood or other potentially infectious materials that may be released during handling, contaminated sharps, pathological waste and microbiological waste containing blood or other potentially infectious material.

4.2.2 These items will be placed in "red" biohazard bags, labeled with "radioactive" tape containing the isotope, study number, date and technician initials.

4.2.3 These materials will be taken to the basement radioactive waste storage area, placed into a fiberboard storage drum, stored for decay, and then incinerated as biomedical waste.

4.2.4 Carcasses will be handled according to sections 2.6 and 2.7.

4.3 Liquid Waste

4.3.1 Urine, if not collected for PK, will be discarded into the sanitary sewer.

4.3.2 Waste water resulting from a spill clean-up will be handled as radioactive waste according to the requirements in Section 12.3.3. It will be labeled and brought to the radio analysis laboratory in sealed containers.

4.3.3 Liquid waste may be discarded in specifically designated sinks if it meets the following conditions:

- It is water soluble or dispersible.
- The radiochemical concentration of the liquid does not exceed the allowable activity or quarterly limit for the isotope indicated in the SSPs for Radioactive Waste Disposal.
- It does not exceed the total daily limits for each isotope as posted above the radioactivity disposal sink.
- The amount discarded is recorded on the form located next to the radioactive disposal sink.

4.3.4 Any liquids which do not meet these conditions should be held for decay by transferring to polypropylene bottles, labeled and stored in the basement radioactive waste storage area. Labeling should include isotope, activity, study number, date, and initials of the technician.

4.4 Sharps

4.4.1 Sharps (e.g. hypodermic needles and syringes and scalpel blades) are placed into puncture resistant plastic "sharps" containers. They will be labeled and stored for decay.

4.4.2 Separate radioactive from non-radioactive sharps due to storage space limitations.

Long-lived Radionuclides ($T_{1/2}$ >120 days) Except ^{3}H.

4.5 Solid Waste and Bedding

4.5.1 This waste consists of the same items as described in Section 12.1.

4.5.2 Solid material potentially contaminated WILL BE SURVEYED with a GM detector. If no radioactivity is detected, the waste will be disposed of as regular trash.

4.5.3 If the survey detects contamination, then that item or the contaminated portion (as in the case of bench paper) of that item will be placed in a radioactive waste container.

4.5.4 Waste receptacles will be white metal cans with foot-operated lids. Each container is lined with a two mil plastic bag. Do not use a "red" bag.

4.5.5 The contents of full waste containers will be transferred to a 30 or 55 gallon radioactive waste disposal drum in the MAP laboratory for removal by a licensed waste disposal company.

4.5.6 A record of the activity (amount) of waste being disposed will be maintained by filling out the form on the disposal drum. The initial activity of the test article will be used to estimate the activity of spills. Background radioactivity found during routine surveys will be recorded as less that 1 micro curie (<1 μCi).

4.5.7 Dispose of contaminated tubes and tips as regular trash after rinsing and confirmation of decontamination. Use this procedure for studies that generate larger quantities of these items. Consult the RSO for the procedure.

4.6 Mixed Waste

4.6.1 This waste consists of the same items as described in Section 12.2.1.

4.6.2 These materials will be transferred to a 30 or 55 gallon radioactive waste disposal drum in the MAP laboratory.

4.7 Liquid Waste

4.7.1 Urine if not collected for PK will be discarded into the sanitary sewer.

4.7.2 Liquid waste may be discarded in specifically designated sinks if it meets the following conditions:

- It is water soluble or dispersible.
- The radiochemical concentration of the liquid does not exceed the allowable activity or quarterly limit for the isotope indicated in the SSPs for Radioactive Waste Disposal.
- It does not exceed the total daily limits for each isotope as posted above the radioactivity disposal sink.

- The amount discarded is recorded on the form located next to the radioactive disposal sink.

4.7.3 Any liquids which do not meet these conditions should be held for disposal by transferring to polypropylene bottles, stabilized, labeled and stored in 55 gallon drums in the MAP laboratory.

4.8 Sharps

4.8.1 Sharps (e.g. hypodermic needles and syringes and scalpel blades) are placed into puncture resistant plastic "sharps" containers.

4.8.2 Separate radioactive and non-radioactive sharps.

4.8.3 Sharps will be transferred to a 30 or 55 gallon waste disposal drum in the MAP laboratory.

ATTACHMENT 8

State of Mass permit for incinerator

Incinerator License

The Commonwealth of Massachusetts

Executive Office of Environmental Affairs

Department of Environmental Quality Engineering

600 Washington Street, Boston, MA. 02111

DAVID STANDLEY
COMMISSIONER

December 3, 1976

Resource Systems Inc.
P.O. Box 244
Wellesley, Massachusetts 02181

Attention: Mr. Frank Hogan

Re: MBAPCD - Cambridge
Regulation 8
Arthur D. Little Co.
MB-76-IN-014

Gentlemen:

The Department of Environmental Quality Engineering is in receipt of plans, specifications, and Standard Operating Procedure and requesting approval for installation of a Pirsonner Model No. RC-100 incinerator equipped with Incinomite Model No. J-40-DS primary and secondary chamber burners proposed for the Arthur D. Little, Inc., 30 Memorial Drive, Cambridge, Massachusetts.

The finalized plans submitted on October 21, 1976 are two in number, the first of which is titled:

"RC100 Pathological
Incinerator
100 lbs. Per Hour Type 4 Waste"

dated September 18, 1975 and are affixed with the seal of Brian R. Hogan No. 20193 an engineer registered in Massachusetts.

Review of the plans, specifications, and Standard Operating Procedure by Department engineers indicates that they are in conformance with modern incinerator design and practice, and approval is given on December 3, 1976 for the design and Standard Operating Procedure of this unit for the reduction of not more than 75 pounds of Type IV waste per hour at the location indicated.

Approval shall not affect the responsibility of the owner or operator to comply with Regulation 2.5.3, which gives an emission limitation of 0.1 grains/scf at 12% CO_2.

Approval is subject to the following provisos:

1. that plans be made for the installation of suitable flyash control equipment, if in the opinion of the Department such should prove necessary,
2. that the Standard Operating Procedure be suitably and permanently affixed on or near the incinerator,
3. that the unit be operated in accordance with said approved Standard Operating Procedure.

4. that notification to the Metropolitan Boston Air Pollution Control District be made when the unit is operational.

Failure to comply with these conditions will constitute a violation of the Regulations.

Be advised that this approval is for air pollution matters only and does not negate the owner/operator from complying with other applicable laws or regulations.

The Department may revoke approval if the construction is not begun within two years from the date of issuance, or if the construction work is suspended for one year (Regulation 2.1.4).

Very truly yours,

Anthony D. Cortese, Sc.D.
Director
Division of Air and Hazardous Materials

C - Arthur D. Little Inc.
C - Fire Department
C - Building Department
C - Health Department
C - MBAPCD
C - DAHM

E/ac/rdam

JUL 24 1996

License No. 20-01489-01
Docket No. 030-04605
Control No. 120639

John Green
Vice President & CFO
Genzyme Transgenics Corporation
BIODEVELOPMENT Laboratories
25 Birch Street
Milford, MA 01757

Dear Mr. Green:

This is in reference to your application for renewal of your NRC License. In order to continue our review, we need the following additional information:

1. Provide diagrams of facilities designed or established for special uses (e.g., iodination facilities, waste handling or processing facilities including waste compactor, incinerators, long-term waste storage facilities, animal facilities). Provide full details of facilities where airborne effluent may be released, such as your iodination and waste compacting facilities, including the size, location, fume hood or air handling system specifications, locations of filters and monitors for evaluating releases to the effluent.

2. Provide a description or an organizational chart which shows that the Radiation Safety Officer and the Radiation Safety Committee each has a direct reporting path to senior management.

3. Provide a copy of senior management's written statement of delegation of authority to the Radiation Safety Officer. This statement should include the requisite authority to communicate with and direct your personnel regarding NRC regulations and license provisions and to enforce these requirements including the ability to terminate any unsafe operation involving the use of licensed material.

4. Identify the Radiation Safety Committee Chairperson. Provide documentation on his/her training and experience involving licensed materials and identify his/her position in your organization. Do **NOT** submit a curriculum vitae for each member.

5. Specify the minimum representation that will be required at each meeting of Radiation Safety Committee, and the quorum requirements for voting.

6. Confirm that the Radiation Safety Officer's duties and responsibilities also include meeting with, and briefing the senior management at least once a year on the licensed program.

OFFICIAL RECORD COPY **ML 10**

7. Describe your program for training and refresher training for all persons who handle licensed material or who frequent areas where licensed material is used. This training program must include a review of emergency procedures and response criteria and include sections that are tailored to various types of radiation and ancillary workers such as authorized users, laboratory supervisors and technicians; incinerator operators, waste compactor operators, and purchasing department personnel receiving licensed material; housekeeping, security, and other ancillary personnel; and the radiation safety office staff. Confirm that you will maintain records of initial and refresher training, that include a list of topic(s) covered, the amount of time spent and the date, the instructor(s) and student(s) names. The model training program in Appendix I of Draft Regulatory Guide DG-0005, Second Proposed Revision 2 (enclosed) may be helpful in formulating your response.

8. Specify the types of instruments that will be required for surveys and monitoring by users in laboratories at your facility. Describe the criteria you will use to determine the types, uses, and calibration of users' instruments.

9. You stated that handheld survey instruments will be calibrated every six months. Please confirm that all other survey instruments that are used to ensure compliance with requirements of 10 CFR Part 20 are calibrated at least annually.

10. Describe the surveys you will require and the criteria you will use for release of facilities and equipment for unrestricted use. Confirm that facilities and equipment will not be released until the results of surveys are reviewed and approved by the Radiation Safety Officer. A copy of the NRC "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source, or Special Nuclear Material" is enclosed for your information.

11. Describe your procedures for receiving and opening packages in accordance with requirements of 10 CFR 20.1906. 10 CFR 20.1906(a)(b) and (c) address package receipt requirements and state, in part, that each licensee shall monitor the surfaces of a labeled package for radioactive contamination within 3 hours of receipt if it is received during normal working hours or not later than 3 hours from the beginning of the next working day if it is received after normal working hours. 10 CFR 20.1906(e) addresses package opening requirements and states, in part, that each licensee shall establish and maintain written procedures for safely opening packages in which licensed material is received.

12. Submit your procedures for transfer and transportation of licensed material between authorized users at your facility, and your procedures for transfer and transportation of licensed material to other licensees. Describe your program to control such transfers, including update of material inventory and audits of users' procedures.

13. Describe the criteria your Radiation Safety Committee (RSC) will use to approve authorized users and uses for activities utilizing licensed material. These criteria should specify the minimum acceptable standards for training and experience of the users, facilities and equipment, the operating or handling procedures, the types of surveys or monitoring and the survey frequency requirements. Your application must provide sufficient detail to assure that the RSC evaluations are sufficient in scope and depth to satisfy 10 CFR 33.13(c)(3). The review and approval must be documented by the RSC prior to use of licensed material. Appendix K of the enclosed DG-0005 provides model criteria for approving research authorizations and may be helpful in preparing your response. In addition, you may wish to correlate the survey frequency for research laboratories to the hazard using a scheme such as that found in Appendix J of DG-0005.

14. Please submit a copy of the emergency procedures you will follow in case of spills or other types of accidents involving licensed materials. It is recommended that such procedures contain:

    a. instructions to be followed during minor spills,

    b. instructions to be followed during major spills, and

    c. confirm that your radiation protection officer's name, his office phone number, and a phone number to be used during off-duty hours will be specified on the procedures posted at your facility.

15. Please provide a copy of your laboratory instructions. Typical instructions should include:

    a. Wear laboratory coats or other protective clothing at all times in areas where licensed materials are used.

    b. Wear disposable gloves at all times while handling licensed materials.

    c. Either after each procedure or before leaving the area, monitor your hands for contamination in low-background area.

    d. Do not eat, drink, smoke or apply cosmetics in any area where licensed material is stored or used.

    e. Do not store food, drink or personal effects in areas where licensed material is stored or used.

    f. Wear required personnel monitoring devices at all times while in areas where licensed materials are used or stored.

    g. Dispose of radioactive waste only in designated, labeled and properly shielded receptacles.

h. Never pipette by mouth.

i. Confine radioactive solutions in clearly labeled containers.

j. Secure all licensed material when not under the constant surveillance and immediate control of the authorized users.

16. Please submit a copy of the instructions provided to animal caretakers for handling of animals, animal waste carcasses, and cleaning and decontamination of animal cages.

17. Describe your licensed material inventory, control and accountability program. Your inventory and control system should have the capability to assure that licensed material possession limits are not exceeded and that material is accountable throughout the institution at any given time.

18. 10 CFR 33.13 and 33.14 require applicants to establish administrative controls and provisions relating to management review necessary to ensure safe operations. 10 CFR 20.1101(c) requires that the licensee review the radiation protection program content and implementation at least annually. DG-0005 recommends that an audit and appraisal program be part of the management review. Provide the following information regarding the management review program:

a. Describe the senior management oversight of your radiation safety program. Specify the mechanisms that will be used by senior management to ensure that they are aware of the NRC regulations, the provisions of the license, and the compliance status of the institution's licensed program.

b. Confirm that the Radiation Safety Committee performs an audit of the overall radiation safety program, the Radiation Safety Officer performance, and the radiation staff performance at least annually, and that the results of the audit will be reported to senior management.

c. Specify the types and frequencies of audits that will be implemented by the Radiation Safety Officer and staff to determine user compliance with the requirements of the NRC license, your radiation safety program, and the users' Radiation Safety Committee permit. These audits should include such topics as: reviews of users' inventory and survey records, evaluation of users' training through observation and discussion, and performance of independent work area surveys.

d. Specify the types and frequencies of surveys and monitoring that will be performed by the Radiation Safety Officer and staff. Confirm that surveys will include both unrestricted and restricted areas. The survey frequency may be based on a hazard scheme such as that found in Appendix J of DG-0005, and must be performed at least quarterly.

19. Provide a complete description of the routine survey program, including the areas to be surveyed, the types and levels of radiation and contamination considered to be acceptable, and provisions for maintaining records of surveys. The individual user should supplement the surveys performed by the radiation staff. Regularly used laboratories should be surveyed for contamination at the end of each workday (except when quantities less than those in Appendix C to 10 CFR Part 20 are handled by an employee at any one time), and the user should maintain records of each surveys in units required by 10 CFR Part 20, even if only a single measurement is necessary.

20. Specify the action limits for radiation and contamination surveys and the actions to be taken when these limits are exceeded. The action limits should be in appropriate units.

21. Specify the criteria used to assign personnel monitoring devices (e.g., film/TLD whole body and extremity badges), state the device processing frequency for the various laboratory types, and your dosimetry system processor who is required to be NVLAP approved. If direct reading dosimeters will be used, specify the calibration frequency and method.

27 10 CFR 20.1201 requires, in part, that skin dose be limited to 50 rems per year. 10 CFR 20 2203(b) requires, in part, that each report filed in response to a reportable event include an estimate of each individual's dose. The NRC has observed that programs of your scope have experienced skin contamination incidents. Describe your procedures for assessing dose from skin contamination with licensed material.

23. Describe your procedures for complying with Sections 20.1203, 20.1204, and 20.1302 of 10 CFR Part 20, for procedures such as protein iodinations and tritium labeling experiments that may release volatile or gaseous radioactive materials to restricted and unrestricted areas. You should include a description of the type of surveys (e.g., environmental or breathing zone), frequency of surveys, and the individuals who will perform the surveys (e.g., radiation safety officer or investigator), equipment to be used, and the procedures for evaluating the results.

24. Describe your bioassay program, including the type of bioassay (thyroid counts, urine counts, whole body counts, etc), the criteria and the frequency for performing bioassays, and the type of action taken when positive results are obtained. It is recommended that bioassay procedures be considered for personnel using millicurie quantities of tritiated organic compounds, iodine-131, and iodine-125 in noncontained forms.

25. Provide your procedures for disposal of licensed radioactive waste by decay-in-storage. Your procedures must provide assurance that you will:

    a. hold radioactive waste in storage for at least 10 half-lives,

b. survey the waste in a low background area with a low-level survey meter with all the shielding removed,

c. not dispose of the waste as normal trash unless the radiation level is at background,

d. remove or deface the radioactive material labels or otherwise indicate that containers no longer hold radioactive materials, and

e. you will maintain records of these waste disposal surveys.

"Guidance to Licensees Regarding Requests to Dispose of Radioactive Waste by Decay-In-Storage" (enclosed) may be helpful in preparing your response.

26. In order for the NRC to authorize you to dispose of licensed materials by incineration, you must submit evidence that all state and local regulations concerning incineration of radioactive material have been met by your institution.

27. 10 CFR 20.2003(a)(1) requires that a licensee may discharge licensed material into sanitary sewerage if the material is readily soluble (or is readily dispersible biological material). Information Notice 94-07 (enclosed) provides methods for determining compliance with this requirement which are acceptable to the NRC.

Please review this Information Notice and provide specific information as to how you will assure that your releases to the sanitary sewerage system will meet the solubility criteria in 10 CFR 20.2003(a)(1). If you wish, you may indicate that you will use one of the methods described in Information Notice 94-07. Otherwise, describe your alternative methodology including the models, calculations, analytical techniques, and quality control measurements as well as the records that will be maintained.

In addition, provide calculations to show compliance with 10 CFR 20.2003(a)(2)(3)(4) and confirm that records will be maintained of all disposals made into the sanitary sewage system.

28. Confirm that you will maintain records of the following activities:

a. radiation safety training, including initial and retraining, list of topics covered, the amount of time spent, the date(s), and the instructor(s) and student(s) names.

b. Radiation Safety Committee meeting minutes, including review and approval of authorized users and uses of licensed material

c results of audits performed by the Radiation Safety Committee

d. results of audits and surveys performed by the Radiation Safety Officer and staff

e. decay-in-storage waste records, including the date licensed material is placed into storage, and the date and results of surveys performed when disposed

f. receipt and transfer of licensed material

g. licensed material inventory

h. calibration of radiation monitoring instruments and equipment

29 Describe how you will preclude the unauthorized removal of licensed material from the place of storage and in restricted and unrestricted areas, as required by 10 CFR 20.1801 and 20.1802.

30. Your application should have been signed by a management representative rather than the Radiation Safety Officer. Please submit a letter signed by a management representative indicating that management has reviewed the application and concurs in the statements and representations contained therein. Note also that a management representative should sign all future correspondence which request change in your license.

We will continue our review upon receipt of this information. Please reply in duplicate to my attention at the Region I Office and refer to Mail Control No. 120639. If you have any technical questions regarding this deficiency letter, please call Dr. Sattar Lodhi at (610) 337-5364.

In order to continue prompt review of your application, we request that you submit your response to this letter within 30 calendar days from the date of this letter.

Sincerely,

OFFICIAL RECORD COPY

John D. Kinneman, Chief
Nuclear Materials Safety Branch 2
Division of Nuclear Materials Safety

License No. 20-01489-01
Docket No. 030-04605
Control No. 120639

cc w/encl:
Jeffrey Grant
GTC/TSI Mason Laboratories
57 Union Street
Worcester, MA 01608

Enclosures:
1. 10 CFR Parts 19, 20, 30, and 70
2. Regulatory Guides 8.25, 8.32
3. Draft Regulatory Guide DG 0005
4. Guidelines for Decontamination of Facilities and Equipment prior to Release for Use or Termination of Licenses for Byproduct, Source, or Special Nuclear Materials
5. Guidance to Licensees Regarding Requests to Dispose of Radioactive Waste by Decay-in-Storage
6. Information Notice 94-07

DOCUMENT NAME: R:\WPS\DLTR\L2001489.01X
To receive a copy of this document, indicate in the box: "C" = Copy w/o attach/encl "E" = Copy w/ attach/encl "N" = No copy

OFFICE	DNMS/RI	N	DNMS/RI	N				
NAME	Slodhi		JKinneman					
DATE	07/22/96		07/23/96		07/ /96		07/ /96	

OFFICIAL RECORD COPY

genzyme (TSI) transgenics

Mason Laboratories

12 August 1996

John D. Kinneman, Chief
Nuclear Materials Safety Branch 2
Division of Nuclear Materials Safety
475 Allendale Road
King of Prussia, PA 19406-1415

Subject: Renewal to By-Product Materials License No. 20-01489-01 (extended)
Mail Control No. 120639

Dear Mr. Kinneman,

Regarding the above subject, your letter to me did not contain the enclosures as specified on page 7. Based on conversations with Betsy Olreck on 8/1/96, these enclosures were forwarded and subsequently received by me on 8/9/96.

Based on this receipt date, you should anticipate the requested additional information on 9/6/96.

Sincerely,

JGrant

R. Jeffrey Grant
GTC/TSI Mason Laboratories
57 Union Street
Worcester, MA 01608

cc:
John Green
Vice President & CFO
Genzyme Transgenics Corporation
25 Birch Street
Milford, MA 01757

Joe Swiniarski
Radiation Safety Officer
GTC/TSI Mason Laboratories
57 Union Street
Worcester, MA 01608

120639

OFFICIAL RECORD COPY

ML 10

genzyme TSI transgenics

BioDevelopment Laboratories

MS-16
Q2

14 May 1996

Sattar Lodhi, Ph.D.
US Nuclear Regulatory Commission
Region I Material Section B
475 Allendale Road
King of Prussia, Pa 19406

Subject: Renewal of By-Product Materials License No. 20-01489-01
Mail Control no.: 120639

Dear Dr. Lodhi:

The purpose of this letter is to modify our application for renewal of the subject license. A check for $2200.00 was submitted with the original application to cover the category 3L fee.

BioDevelopment Laboratories, Inc. (BDL), the licensee named in the original application for renewal, has recently been acquired by Genzyme Transgenics Corporation (GTC) and that corporation has assumed responsibility for operations under the license.

GTC wish to renew License No 20-01489-01 as presently constituted in license amendment No. 54, dated October 27 1995 (Docket No. 030-04605/030-04694). (see attachment 1).

An application for renewal is included with this letter. We will provide any additional information that you may require.

GTC's (the licensee) corporate address is 25 Birch St., Milford MA 01757. Mail requiring immediate action should be sent to the Radiation Safety Office at GTC/TSI Mason Laboratories, 57 Union St., Worcester, MA 01608.

We would be pleased to provide any additional information regarding our request for renewal that you may need. The person to be contacted about this application is Joseph Swiniarski at (617)-441-1000 or (617)-441-1023.

Sincerely yours,

Joseph Swiniarski, MA
Senior Scientist/RSO
Enclosures

120639
MAY 17 1996

OFFICIAL RECORD COPY

ML 10

NRC FORM 313 U. S. NUCLEAR REGULATORY COMMISSION

(10-94)
10 CFR 30, 32, 33
34, 35, 36, 39 and 40

APPLICATION FOR MATERIAL LICENSE

APPROVED BY OMB: NO. 3150-0120
EXPIRES 5-30-96

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 9 HOURS. SUBMITTAL OF THE APPLICATION IS NECESSARY TO DETERMINE THAT THE APPLICANT IS QUALIFIED AND THAT ADEQUATE PROCEDURES EXIST TO PROTECT THE PUBLIC HEALTH AND SAFETY. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (T-6 F33), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0120), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

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. 030-04605

APPLICATION FOR DISTRIBUTION OF EXEMPT PRODUCTS FILE APPLICATIONS WITH:

DIVISION OF INDUSTRIAL AND MEDICAL NUCLEAR SAFETY
OFFICE OF NUCLEAR MATERIALS SAFETY AND SAFEGUARDS
U.S. NUCLEAR REGULATORY COMMISSION
WASHINGTON, DC 20555-0001

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:

LICENSING ASSISTANT SECTION
NUCLEAR MATERIALS SAFETY BRANCH
U.S. NUCLEAR REGULATORY COMMISSION, REGION I
475 ALLENDALE ROAD
KING OF PRUSSIA, PA 19406-1415

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

NUCLEAR MATERIALS LICENSING SECTION
U.S. NUCLEAR REGULATORY COMMISSION, REGION II
101 MARIETTA STREET, NW, SUITE 2900
ATLANTA, GA 30323-0199

IF YOU ARE LOCATED IN:

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

MATERIALS LICENSING SECTION
U.S. NUCLEAR REGULATORY COMMISSION, REGION III
801 WARRENVILLE RD.
LISLE, IL 60532-4351

ALASKA, ARIZONA, ARKANSAS, CALIFORNIA, COLORADO, HAWAII, IDAHO, KANSAS, LOUISIANA, MONTANA, NEBRASKA, NEVADA, NEW MEXICO, NORTH DAKOTA, OKLAHOMA, OREGON, PACIFIC TRUST TERRITORIES, SOUTH DAKOTA, TEXAS, UTAH, WASHINGTON, OR WYOMING, SEND APPLICATIONS TO:

NUCLEAR MATERIALS LICENSING SECTION
U.S. NUCLEAR REGULATORY COMMISSION, REGION IV
611 RYAN PLAZA DRIVE, SUITE 400
ARLINGTON, TX 76011-8064

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 JURISDICTIONS.

1. TYPE OF APPLICATION FOR *(Check appropriate item)*

- [ ] A. NEW LICENSE
- [ ] B. AMENDMENT TO LICENSE NUMBER _____
- [XX] C. RENEWAL OF LICENSE NUMBER 20-01489-01

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

Genzyme Transgenics Corporation
25 Birch St., Milford MA 01757
Mailalso to: GTC Mason Labs
57 Union St. Worcester MA 01608

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

57 Union St., Worcester MA 01608
83 Rogers St., Cambridge MA 02142
134 Main St., Cambridge MA 02142
30 Memorial Drive, Cambridge MA 02142

4. NAME OF PERSON TO BE CONTACTED ABOUT THIS APPLICATION

Joseph Swiniarski

TELEPHONE NUMBER
617-441-1023

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 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: 10CFR170.31(3)L | AMOUNT ENCLOSED $

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, 36, 39 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.

CERTIFYING OFFICER – TYPED/PRINTED NAME AND TITLE	SIGNATURE	DATE
Joseph Swiniarski Sr. Scientist/RSO	Joseph Swiniarski	5/12/96

FOR NRC USE ONLY

TYPE OF FEE	FEE LOG	FEE CATEGORY	AMOUNT RECEIVED	CHECK NUMBER	COMMENTS
			$		
APPROVED BY			DATE		MAY 17 1996 120639

US Nuclear Regulatory Commission
Region I Material Section B

Radioactive Material License Application

Item 1: Application

This is a modification of an application for renewal of license number 20-1489-01

Item 2: Name and Mailing Address

The licensee's name and corporate mailing address is

Genzyme Transgenics Corporation
25 Birch Street
Milford, Massachusetts 01757

However, activities involving radioactive materials are centered at GTC's TSI Mason division in Worcester MA. In order to minimize delay in passage of information to and fro, mail should be directed to the GTC/TSI Mason address and to the attention of the Radiation Safety Officer and/or the Health and Safety Officer. The TSI Mason mailing address is

GTC/TSI Mason Laboratories
57 Union Street
Worcester MA 01608

Item 3.: Addresses where licensed material will be used

Licensed material may be used at these GTC facilities:

TSI Mason Laboratories, 57 Union Street, Worcester, MA 01608
BioDevelopment Laboratories, 30 Memorial Drive (2d floor), Cambridge, MA 02142
BioDevelopment Laboratories, 134 Main Street, Cambridge, MA 02142
BioDevelopment Laboratories, 83 Rogers Street, Cambridge, MA 02142.

Item 4: Name of person to be contacted about this application

The primary contact person will be Mr. Joseph Swiniarski at 617-441-1023.

The secondary contact person will be Mr. Jeffrey Grant at 508-791-0931

US Nuclear Regulatory Commission
Region I Material Section B

Items 5: Radioactive Material

The parts of the renewed license describing radioactive materials and possession limits should be the same as those listed in GTC's NRC License No. 20-01489-01 parts 6 and 12 (see attachment 1)

Item 6: Purposes for which licensed material will be used

Research and development as defined in 10CFR30.4; animal studies

Item 7: Individuals responsible for the radiation safety program

The individual members of the radiation safety committee are:

Mr. R. Jeffrey Grant, Health and Safety Officer at BDL and TSI Mason

Ms. Denise Hayes, Director of Compliance and Quality Assurance Officer at BDL

Mr. Peter Markham, Manager, Metabolism and Pharmacokinetics at TSI Mason

Mr. Joseph Swiniarski, Senior Scientist at BDL and TSI Mason and Radiation Safety Officer

Mr. Paul Zavorskas, Pharmacokinetics Scientist at TSI Mason and Deputy RSO

Members of the RSC each have extensive experience with radiation research and safety programs (see attachment 2). Jeff Grant's position within the company requires him to participate actively along with the RSO in day-to-day oversight of activities involving radiation and radioactive material. That experience plus his hands-on radiation laboratory experience make him a most valuable member of the RSC. Denise Hayes, early in her career, spent about 10 years working daily with radioactive materials in Arthur D. Little, Inc.'s Metabolism and Pharmacokinetics Section before moving on to Compliance and QA. Peter Markham has 10 years' experience with radioactive materials use in laboratory settings and Joe Swiniarski has spent more than 25 years in the field. Paul Zavorskas, in addition to having hands-on laboratory experience with radioactive materials, was radiation safety officer for on Mason's NRC license No. 20-11085-01 until it was terminated upon merging with BDL. The radiation safety committee acts in a staff capacity reporting to the President of GTC, the licensee, the President of TSI Mason and the General Manager of BDL. At this time the President

US Nuclear Regulatory Commission
Region I Material Section B

of GTC is James Geraghty. Reporting to him is the President of TSI Mason, Michael Wyand, Ph.D. and the General Manager of BDL, Michael Lovell, Ph.D. GTC.

Item 8. Training for individuals working in or frequenting restricted areas

The information requested in item 8 is be included in item 10, below.

Item 9. Facilities and equipment

Floor plans of licensed facilities are attached to this application (attachment 3).

The Company's operations at its animal facility 134 Main St., Cambridge are restricted to a limited access suite of rooms, Rooms 107 through 109A inclusive and to the biological waste incinerator rooms 128 & 129. The animal rooms are reserved for administration to animals of radiolabelled compounds followed by biological sam le collection. Soiled equipment is cleaned within this suite, The incinerator is used for disposal of carcasses. Operations at 30 Memorial Drive Cambridge are restricted to the second floor of that building. Rooms 200, 202, 203 204 205 and 212b are reserved for preparation, separation, quantification or structure determination of biologically active compounds. These rooms are currently being decommissioned and decontaminated prior to being returned to unrestricted use. Room 219D houses a separately licensed Shepherd Mark I Model 68 Cs-137 sealed source irradiator (NRC lic. no. 20-01489-05). Operations at 83 Rogers St. Cambridge are limited to the mass spectroscopy and liquid chromatography laboratories. The 30 Memorial Drive and 134 Main St. buildings are locted together back-to-back and the 83 Rogers St. building is located two blocks away from the other two buildings.

The 57 Union St., Worcester facility is a five story building housing animal facilities, laboratories and office space. Licensed materials are used primarily in the metabolism and pharmacokinetics laboratories in rooms 470 through 479. Waste being held for shipment or for decay is kept in the basement area marked "storage." Incoming materials are met on the first floor receiving area. Room 351 contains an X-ray unit, a C-arm fluoroscope and a gamma camera. Necropsies are performed in rooms 332 and 504.

Instruments available on site for measuring radioactivity are listed below. This list is subject to change. Handheld survey instruments are calibrated at 6-month intervals by Bolton and Galanek (NRC lic no. 20-13302-01). Stationary instruments are calibrated when used. Calibration standards are obtained from

US Nuclear Regulatory Commission
Region I Material Section B

commercial suppliers.

Instrument	Manufacturer	Model	#
Scintillation Counter	Beckman	LS-6000SE	1
Scintillation counter	Beckman	LS-6000IC	1
Scintillation counter	Packard	TriCarb 4000	1
Gamma counter	Packard	Multi-Prias 5304	1
Gamma counter	Packard	Auto-Gamma 5650	
Radiometric detector	Packard	Flo-one\Beta radiochromatography	
Calibrator	Capintec	CRC-15R dose calibrator	
Sample oxidizer	Packard	D306	1
Ion chamber	Victoreen	450P	1
Count ratemeter	Ludlum	12	4
Count ratemeter	Ludlum	3	11
Probes	Ludlum	44-9	7
Probes	Ludlum	44-7	3
NaI low energy gamma scintillator probe	Ludlum	44-3	2
G-M beta gamma	Atomic Products	069-701	1
Sample Combustion	Packard	307	

US Nuclear Regulatory Commission
Region I Material Section B

Item 10. Radiation Safety Program

The Radiation Safety Committee (RSC) consists of at least one management representative, the company Health and Safety Officer (HSO) and professional staff members experienced in use of radioactive materials. The members of the committee currently are

Mr. R. Jeffrey Grant, Health and Safety Officer at BDL and TSI Mason

Ms. Denise Hayes, Director of Compliance and Quality Assurance Officer at BDL

Mr. Peter Markham, Manager, Metabolism and Pharmacokinetics at TSI Mason

Mr. Joseph Swiniarski, Senior Scientist at BDL and TSI Mason and Radiation Safety Officer

Mr. Paul Zavorskas, Pharmacokinetics Scientist at TSI Mason and Deputy RSO

The RSC meets at least quarterly to review the current status of the program including activities and occurrences since the previous meeting, upcoming activities involving use of radioactive materials and planning for improvement. The meeting's minutes are recorded and are maintained in the HSO's office. The RSC act in a staff capacity reporting directly to the Presidents of GTC, TSI Mason and BDL. The duties and responsibilities of the RSC include

establishing and implementing company policy relating to procurement, use, transfer and disposal of radioactive material

assuring that investigators are aware of their duties and responsibilities when radioactive materials are in their possession

authorizing use of radioactive materials under the conditions that users are properly trained, experimental design includes precautions to preclude or minimize exposure of persons or property and facilities and equipment are adequate to the task

conducting periodic inspections of facilities where radioactive materials are used or stored to ensure that company procedures are being followed and activities comply with federal and state regulations

US Nuclear Regulatory Commission
Region I Material Section B

revoking authorizations to use or dispose of licensed materials. Criteria for revocation include, but are not limited to unauthorized use or disposal of licensed material, violation of federal, state or local regulations or violation of company policy.

Any RSC member, acting independently, may carry out the duties and responsibilities of the RSC, provided that the RSC, as a whole, is notified in timely fashion and is included in decisions affecting operation of experiments.

The radiation safety officer (RSO) is responsible for the day-to-day co-ordination and management of the company's radiation program. The RSO consults with project leaders and oversees operations involving use of licensed material. The RSO has the authority to terminate a project for cause at any time. The RSO is available during normal working hours and performs assignments whenever required. The RSO is also a member of the company's professional staff and performs certain work outside of the radiation safety office. The company's Health and Safety Office assists the RSO as needed. RSO duties and responsibilities include implementation and oversight of

procurement, use and disposition of radioactive material by conducting surveys of work and storage area and by inspecting users records. The frequency of surveys and inspections will be based on the nature and quantity of the isotope, the study's duration and the investigator's experience and prior performance

conduct of periodic audits to evaluate users' performance and to establish degree of compliance with regulations and policy

receipt and shipment of radioactive materials

inventory of radioactive materials receipt, use and disposal within the company

waste disposal

exposure monitoring program that includes record-keeping for film badges, bioassays and exposure histories

calibration of survey instruments and leak testing of sealed sources

training programs that instruct personnel in procedures for use,

US Nuclear Regulatory Commission
Region I Material Section B

transfer , disposal and storage of radioactive material, for survey and wipe test procedures, waste minimization procedures and methods and concepts for minimizing exposure.

decontamination procedures in case of accident or spill

The RSC developed a written Radiological Health and Safety Guide (the Guide's table of Contents is included here as Attachment 4) to describe the Company's radiation safety program. The program's objective is to assure that radioactive materials are used safely and to minimize quantities used. The Guide provides a description of the elements of the radiation safety program. The Guide is used as a basic training aid for new employees and as a basis for refresher training of current employees. It includes pertinent sOPs and recorded-keeping forms. Copies of the Guide are sited for easy reference in areas where radioactive materials are used and personal copies are made available on demand. Among the topics included in the Guide are

Radiation Protection Regulations and Policies
Fundamentals of Radioactivity
Personnel Health
Acquisition and Use of Radioactive Material
Contamination Action Limits
Surveying and Wipe Testing
Waste Disposal
Staff Responsibilities
Emergency Procedures

The RSC controls procurement of radioactive materials through a formal authorization procedure. Technically qualified personnel apply in writing on a standard form to the RSC to obtain permission to use radioactive material. The form asks for a description of the project, relevant safety issues, competence and training status of personnel to be assigned to the project, facilities and equipment required, and the amount and class of waste expected to be generated. During its review of the application the RSC determines if the need for protection, including bioassay, are being met. The RSC also reviews study protocols, procedures and amounts requested with an eye to limiting the authorized amounts used to no more than are needed to complete the study. The RSC reserves the right to withhold approval of use of radioactive materials for any cause.

US Nuclear Regulatory Commission
Region I Material Section B

Item 11: Waste Management

The Company's radioactive waste stream consisits of small quantities of biological waste, such as animal carcasses, tissues, cells and laboratory waste, such as paper, plastic, or glass items, such as scintillation vials. The primary long-lived constituents of the waste stream are C-14 and H-3.

Radioactive animal carcasses, organs and tissues are bagged, labelled and placed in a designated "radioactive materials" freezer for subsequent incineration. Each bag is labelled with a bag number. The bag number is entered into a logbook kept with the freezer. The log contains the name of the investigator, project name or number, date, amount of biological material, isotope, total activity. After a batch of material is incinerated, three aliquots of ash are scintillation counted to determine activity per gram. If the activity of the ash meets the criteria of 20.2004, 20.2005 and Appendix B to part 20 the waste is disposed of as ordinary solid waste. If the ash does not meet these criteria it is disposed of as radioactive waste. Records of incinerator performance are maintained to provide data for calculating effluent concentrations

Paper,plastic, glass and other laboratory items that have fixed radioactivity are disposed of as uncompacted dry solid Class A waste. Bags stands are used in the laboratory to collect these items for later transfer to lined steel drums. A record of the transfer is made in the drum inventory log.

C-14 and H-3 are the only long half life isotopes that are counted by liquid scintillation and the activity is kept below 0.05 microcuries per gram. Scintillation vials are transferred to drums in a hazardous waste storage area and logged in.

Liquid radioactive wastes are collected into absorbent-filled plastic or metal containers in secondary containment. When the absorbent has reached its capacity, the container is sealed, drummed and an entry made in the drum log.

Item 12: Fee Category

The fee category is 10CFR170.31(3)L. A check for the fee was submitted at the time of the original application for renewal. Please advise us of any additional fee required.

US Nuclear Regulatory Commission
Region I Material Section B

Attachment 1
14 May 1996

Genzyme Tansgenics Corporation's NRC Materials License 20-01489-01
for facilities at TSI Mason in Worcester and BioDevelopment Labs in Cambridge

NRC FORM,374
(7-94)

U.S. NUCLEAR REGULATORY COMMISSION

Amendment No. 54

MATERIALS LICENSE

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

Licensee	
1. Genzyme Transgenics Corporation 2. 25 Birch Street Milford, Massachusetts 01757	In accordance with the letter dated October 27, 1995, 3. License Number 20-01489-01 is amended in its entirety to read as follows: 4. Expiration Date November 30, 1994 (extended) 5. Docket or Reference No. 030-04605/030-04694

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 with Atomic Nos. 3 through 83 and with half lives of 120 days or less	A. Any	A. Not to exceed 10 millicuries per isotope, 1 curie total
B. Any byproduct material with Atomic Nos. 1 through 83 and with half lives greater than 120 days	B. Any	B. See Condition 12
C. Any byproduct material with Atomic Nos. 84 through 95	C. Any	C. See Condition 12
D. Technetium 99m	D. Any	D. 100 millicuries
E. Iodine 125	E. Any	E. 50 millicuries
F. Hydrogen 3	F. Foils (Varian Aerograph Model 022-000104-00)	F. Not to exceed 250 millicuries per foil and 5000 millicuries total

9. Authorized use

A. through E. Research and development as defined in 10 CFR 30.4; animal studies.
F. For use in Varian Aerograph Group I and II gas chromatography device for sample analysis.

CONDITIONS

10. Licensed material may be used only at the licensee's facilities located at 30 Memorial Drive (second floor), 134 Main Street and 83 Rogers Street, Cambridge, MA and 57 Union Street, Worcester, Massachusetts

11. A. Licensed material shall be used by, or under the supervision of, individuals designated in writing by the Radiation Safety Committee, Joseph Swiniarski, Chairperson.

B. The Radiation Safety Officer for this license is Joseph Swiniarski.

12. In addition to the possession limits in Condition 8, the licensee shall further restrict the possession of NRC licensed material to 10^4 times the quantity specified in Appendix B to 10 CFR Part 30 and in accordance with the requirements of 10 CFR 30.35.

13. Licensed material shall not be used in or on human beings.

14. A. Sealed sources and detector cells containing licensed material shall be tested for leakage and/or contamination at intervals not to exceed six months or at such other intervals as are specified by the certificate of registration referred to in 10 CFR 32.210, not to exceed three years.

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 three months.

C. In the absence of a certificate from a transferor indicating that a leak test has been made within six 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 and detector cells 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 transfer 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 test shall be capable of detecting the presence of 0.005 microcurie of radioactive material on the test sample. 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 or detector cell shall be removed immediately from service and decontaminated, repaired, or disposed of in accordance with Commission regulations. The report shall be filed within five days of the date the leak test result is known with the U.S. Nuclear Regulatory Commission, Region I, ATTN: Chief, Nuclear Materials Safety Branch, 475 Allendale Road, King of Prussia, Pennsylvania 19406. The report shall specify the source or detector cell involved, the test results, and corrective action taken.

G. The licensee is authorized to collect leak test samples for analysis by the licensee. Alternatively, tests for leakage and/or contamination may be performed by persons specifically licensed by the Commission or an Agreement State to perform such services.

15. The licensee shall conduct a physical inventory every six months to account for all sealed sources and devices containing licensed material received and possessed under the license.

16. Sealed sources or detector cells containing licensed material shall not be opened or sources removed from source holders by the licensee.

17. The licensee shall not acquire licensed material in a sealed source or device unless the source or device has been registered with the U.S. Nuclear Regulatory Commission pursuant to 10 CFR 32.210 or equivalent regulations of an Agreement State.

18. A. Detector cells containing a titanium tritide foil or a scandium tritide foil shall only be used in conjunction with a properly operating temperature control mechanism which prevents the foil temperatures from exceeding that specified in the certificate of registration referred to in 10 CFR 32.210.

B. When in use, detector cells containing a titanium tritide foil or a scandium tritide foil shall be vented to the outside.

19. The licensee shall not use licensed material in field applications where activity is released except as provided otherwise by specific condition of this license.

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

21. 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. Waste to be disposed of in this manner shall be held for decay a minimum of ten half-lives.

B. Before disposal as ordinary trash, the waste shall be surveyed at the container surface with the appropriate survey instrument 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. A record of each such disposal permitted under this License Condition shall be retained for three 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.

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

23. Pursuant to Sections 20.106(b) and 20.302 of 10 CFR Part 20, the licensee is authorized to dispose of licensed material by incineration provided the gaseous effluent from incineration does not exceed the limits specified for air in Appendix B, Table II of 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 of 10 CFR Part 20.

MATERIALS LICENSE
SUPPLEMENTARY SHEET

License Number: 20-01489-01

Docket or Reference Number: 030-04605

Amendment No. 54

24. 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 Nuclear Regulatory Commission's regulations shall govern unless the statements, representations, and procedures in the licensee's application and correspondence are more restrictive than the regulations.

A. Application dated January 27, 1988
B. Letter received March 17, 1989
C. Letter dated March 22, 1989
D. Letter dated June 16, 1989
E. Letter dated August 1, 1989
F. Letter dated September 1, 1989
G. Letter dated October 18, 1989
H. Letter dated November 8, 1993
I. Letter dated November 9, 1993
J. Letter dated November 20, 1993
K. Letter dated November 23, 1993
L. Letter dated November 24, 1993
M. Letter dated December 2, 1993
N. Letters dated May 16, 1994
O. Letter dated June 17, 1994
P. Letter dated September 26, 1994
Q. Letters dated November 29, 1994
R. Letter dated July 17, 1995
S. Letter dated October 27, 1995

For the U.S. Nuclear Regulatory Commission

Date FEB 23 1996

By _____
Nuclear Materials Safety Branch
Region I
King of Prussia, Pennsylvania 19406

US Nuclear Regulatory Commission
Region 1 Material Section B

Attachment 2
14 May 1996

Radiation Safety Committee Member Qualifications

genzyme TSI transgenics

Mason Laboratories

R. JEFFREY GRANT

Health and Safety Officer

EDUCATION:

1980	M.A., (Biology), Anna Maria College, Paxton, MA
1971	B.A.,(Biology), St. Francis College, Biddeford, ME

PROFESSIONAL EXPERIENCE:

1987-Present	**Health and Safety Officer,** TSI Mason Laboratories, Worcester, MA
1986-1987	**Health and Safety Officer,** Department of Toxicology and Chemical Carcinogenesis, Mason Research Institute, Worcester, MA
1980-1989	**Chemistry Coordinator,** Department of Toxicology and Chemical Carcinogenesis, Mason Research Institute, Worcester, MA
1980-1982	**Health and Safety Officer,** NTP Studies, Mason Research Institute, Worcester, MA
1974-1979	**Lab Technician,** Mason Research Institute, Worcester, MA
1973-1974	**Fire Specialist,** State of Connecticut Department of Environmental Protection, Hartford, CT
1971-1972	**Lab Technician,** Mason Research Institute, Worcester, MA

CERTIFICATION:

1994 Board of Certified Safety Professionals (CSP)

SOCIETY MEMBERSHIPS:

American Chemical Society
New England Section American Industrial Hygiene Association
American Society of Safety Engineers

TRAINING AND SEMINARS:

1994 Ergonomics Conference, University of New Hampshire

1991 OSHA Comprehensive Regulatory Compliance Training Course, GZA-AET Regulatory Services

1990 Laboratory Safety Short Course, James A. Kaufman

1990 Hazardous Chemical Spill Response Workshop, J.T. Baker

1989 Control of Biohazards in the Research Laboratory, the Johns Hopkins University

1989 Conducting Safety Audits, American Society of Safety Engineers

1988 Biosafety Conference for Industrial Hygienists, University of North Carolina

1988 Occupational and Environmental Radiation Protection, Harvard School of Public Health

1987 Massachusetts Hazardous Waste Seminar, Applied Environmental Technologies Corporation

1986 Waste Management Seminar, Clean Harbors, Inc.

1986 Fundamentals of Industrial Hygiene, Harvard School Public Health

1984 Hazardous Waste Rules & Regulations, Applied Environmental Technologies Corporation

1980 Safe Handling of Carcinogens, New York University

PUBLICATIONS:

1. LUTHRA, Y.K., ESBER, H.J., GULKIN, T.A., GRANT, R.J. and ROSENKRANTZ, H. The effect of X-irradiation with and without antiradioemetics on serum parameters of immature dogs. Fed. Proc. 37: 738, 1978.

2. ROSENKRANTZ, H., FLEISCHMAN, R.W. and GRANT, R.J. Toxicity of short-term administration of cannabinoids to rhesus monkeys. Toxicol. Appl. Pharmacol. 58: 118-131, 1981.

3. ROSENKRANTZ, H., GRANT, R.J., FLEISCHMAN, R.W. and BAKER, J.R. Marihuana-induced embryotoxicity in the rabbit. Fundam. Appl. Toxicol. 7: 236-243, 1986.

Denise Hayes, M.S.
Director of Compliance/Quality Assurance Officer

Education

B.S., Biology, Boston State College, Boston, MA
M.S., Pharmacology, Northeastern University, Boston, MA

Technical Qualifications/Work Experience

Ms. Hayes is Director of Compliance for BioDevelopment Laboratories, an operating unit of Genzyme Transgenics Corporation. In this capacity Ms. Hayes is responsible for oversight of the compliance programs related to quality assurance, occupational and radiological health and safety, controlled substances, and animal care and use As the Quality Assurance Officer for BioDevelopment Laboratories, she plays an active role in the review of standard operating procedures and study protocols, conducts in-process inspections of regulated studies and audits data and final reports for compliance with Good Laboratory Practices (GLP) and Good Manufacturing Practices (GMP) requirements. She also supervises the activities of the Quality Assurance Unit.

As a consultant in the field of quality assurance, Ms. Hayes has also worked with clients in the design of quality assurance programs for specific research and testing efforts. She has also performed QA activities to supplement clients' existing capabilities, as well as provide additional skills to their efforts. She has been involved in the development of a Good Epidemiology Practices program for a major chemical company. For a research foundation she assisted in the design of quality assurance criteria for evaluating grant applications and acted as the quality assurance representative on site visits during application review. For a major cosmetic company she evaluated the quality assurance and control procedures of the Clinical Evaluation Group. The quality assurance programs addressed control of data collection, management, reduction and analysis and documentation of the methodologies used.

Ms. Hayes acts as Quality Assurance Officer for laboratory, clinical and epidemiological studies. She is responsible for pre-study review of protocols, Standard operating procedures, facilities, and personnel. She monitors phases of on-going studies and conducts interim and final data audits to ensure that the study is being conducted in compliance with the study protocol and that the data are accurately reported. She has provided quality assurance support for a wide range of projects including in vitro and in vivo toxicology studies, pre-clinical and clinical metabolism and pharmacokinetics studies, residue and environmental fare studies, human clinical studies on the effects of pollutants on cardiac, pulmonary and behavioral functions and epidemiology studies.

Denise Hayes, M.S., *(continued)*

She has been involved in the assessment of technical data relating to mammalian toxicity and human health effects associated with exposure to a number of environmental pollutants.

Ms. Hayes has participated in studies on the physiological disposition and metabolism of xenobiotics in several species. These projects involved the utilization of a range of enzymatic, radiochemical and other analytic techniques.

Ms. Hayes has over 18 years professional experience at BioDevelopment Laboratories and Arthur D. Little, Inc. and has been a quality assurance professional for more than 10 years. She is a member of the Society of Quality Assurance and is coauthor of on several scientific publications. She was an invited member at the Food and Drug Administration Consensus Workshop on the Use of Computers in Biomedical Research and has made several presentations on the application of quality assurance principles to laboratory and clinical studies.

Denise Hayes, M.S., *(continued)*

Professional Affiliations and Activities

- Vice President, New England Regional Branch, Society of Quality Assurance 1995-1996

- Member, Society of Quality Assurance
  Chairman, 1992 SQA Nominating Committee
  Elected member, Education Committee, 1992-present

- Member, Arthur D. Little, Inc. Animal Research Committee, 1985-1992
  Chairman, 1990-1992

- Deputy Radiation Safety Officer and member, Arthur D. Little, Inc. Radiation Safety Committee. 1992 - 1993. Member, BioDevelopment Laboratories, Radiation Safety Committee, 1993 - present

- Member, American Association for Laboratory Animal Science
  AALAS certified as a laboratory animal technician

- Member, Advisory Board of the Northeast Global Education Center at Salem State College, Salem, Massachusetts

- Lecturer on Good Laboratory Practices, Toxicology Graduate Program, Massachusetts Institute of Technology

  Author, "Ensuring Data Quality: From Data Collection Through Final Report" Health Effects Institute Investigators Conference, Monterrey, CA, 1992

- Co-presenter, Quality Management in Occupational Epidemiology Programs, Epidemiology Resource and Information Center Workshop, Chemical Manufacturers Association, Washington, DC, 1991

- Co-author, "Data Collection Principles," Health Effects Institute Investigators Conference, Colorado Springs, CO, 1988

- Invited member, FDA Consensus Workshop on Computers in Biomedical Research, Eden Isle, AR, October 11-16, 1987

- Co-author, "Establishing a Quality Assurance Unit," Health Effects Institute Investigators Conference, Seabrook Island, SC, 1987

- Co-author, "Quality Assurance Counts," Health Effects Institute Investigators Conference, Pacific Grove, CA, 1986

Denise Hayes, M.S., *(continued)*

- Co-author, "How to Make a Small Quality Assurance Unit Work Big," Society of Quality Assurance, Orlando, FL, 1985

Peter M. Markham, M.S.
Manager, Metabolism and Pharmacokinetics Group

Technical Qualifications:

Mr. Markham has 10 years' experience in *in-vitro* and *in-vivo* metabolism, pharmacokinetics, analytical and bioanalytical chemistry of pharmaceuticals and chemicals. He has developed and utilized analytical methodologies employing TLC, GC, and HPLC. He has conducted studies on the absorption, distribution, metabolism, excretion, and pharmacokinetics (ADMEP) of pharmaceuticals, metabolites, and a diversity of xenobiotics, including pesticides, flame-retardants, and industrial chemicals in rats, mice, dogs, monkeys, and rabbits.

Relevant Experience

- *Pharmaceutical Development.* Mr. Markham has experience in the process of pharmaceutical development. Throughout his professional career, he has conducted chemical and pharmaceutical disposition and pharmacokinetic studies in animals for commercial clients and government agencies. In the role of study director, he designs and conducts studies (both GLP and non-GLP), including development of study design, supervising and conducting studies, developing analytical methods, and writing reports. These studies consist of single and multiple dose pharmacokinetic and metabolism studies in animals, assessments of dose proportionality, dose linearity and bioavailability, interspecies comparisons of metabolic and pharmacokinetic data, and the calculation of plasma and whole body kinetic parameters. He has experience in single and multiple dose oral and intravenous dosing, intravenous infusions, biliary excretion, dermal and intradermal administration.

- *Methods development, analytical, and bioanalytical experience.* Throughout his career he has been responsible for the bioanalytical support of metabolism and pharmacokinetic studies conducted to meet drug registrational requirements. He is directly responsible for method development, validation and routine sample analysis for test materials, and the transfer of assays across species. He supports GLP toxicology studies involving rodents and dogs as well as GCP human clinical pharmacokinetic studies. His support of clinical pharmacokinetic studies includes addressing specific issues of optimizing sample throughput, assay efficiency, and assay transferability.

  His experience includes the adaptation of methodologies for parent drug, to include metabolites, optimizing solid phase and liquid/liquid extraction for simultaneous recovery of non-polar parent compounds and polar metabolites, and method modification to quantify additional metabolites. He has extensive experience in HPLC, and GC assays for nanogram and picogram quantities of analytes. Mr Markham's responsibilities also include the reporting of method validations and sample analysis results for submission to the FDA in support of IND and NDA filings.

  Mr. Markham served as dose preparation supervisor under a Master Agreement Order to the NTP Toxicity and Carcinogenicity Bioassay Program.

He is responsible for preparing radiolabeled compound formulations for commercial clients, NIEHS and NCI programs; in addition, supervises dose formulation preparation and analysis for commercial toxicity studies.

- *Supervisory experience.* Mr. Markham is responsible for the supervision of technical support staff in the performance of experimental work and sample analysis. He directly supervises seven technical staff members.

Education

M.S., Analytical Chemistry, University of Massachusetts, 1987
B.S., Chemistry, University of Massachusetts, 1984

Work History

Manager, Metabolism and Pharmacokinetics Group, TSI Mason Laboratories, Inc., Worcester, MA, 1995-present.

Associate Director, Biodevelopment Laboratories, Inc., Cambridge, MA, 1993-1995.

Senior Consultant, Arthur D. Little, Inc., Cambridge, MA, 1991-1993. Assisting in the management and administration of the Metabolism and Pharmacokinetics Department. This includes hiring personnel, performance evaluation, supervising personnel, allocating resources to various projects, scheduling studies, and all other aspects of the day-to-day management of the department. The work in the Department includes metabolism, disposition, pharmacokinetics, analytical method development and bioanalytical projects, in addition to chemistry support to toxicology studies. The Department serves commercial clients, as well as government agencies, to support the development and world-wide registration of pharmaceuticals, pesticides and other chemicals.

Consultant, Arthur D. Little, Inc., Cambridge, MA, 1989-1991. In the role of study director, planned and conducted ADME and P.K. studies (both GLP and non-GLP) including development of protocols, supervising and conducting studies, developing analytical methods, and production of reports. As laboratory manager, responsibilities include direct supervision of technical personnel, scheduling of experiments and analyses, maintenance of equipment, and development of standard operating procedures. Responsible for development, validation and conduct of bioanalytical assays for the identification and quantitation of pharmaceuticals.

Research Associate, Arthur D. Little, Inc., Cambridge, MA, 1986-1989.
Responsible for organizing and conducting ADMEP studies using radiolabeled compounds, including set-up, dose formulation and analysis, sample collection and analysis, data reduction and tabulation for final reports. Also responsible for HPLC method development for the chromatographic separation and quantitation of parent compound and metabolites in biological fluids.

Research/Teaching Assistant, Department of Chemistry, University of Massachusetts, 1955-1987. Masters thesis involved the GC/ECD determination of specific PCB isomers in sediment and assessment of the effect of varying isomer levels on fish monooxygenase activity through HPLC separation of the *in vitro* metabolites of benzo*[a]*pyrene.

Publications:

Cossum PA, Sasmor H, Dellinger D, Truong L, Cummins L, Owens SR, Markham PM, Shea JP, Crooke S. Disposition of the ^{14}C-Labeled Phosphorothioate Oligonucleotide ISIS 2105 after Intravenous Administration to Rats. *J Pharm Exp Ther* 1993, 267(3):1181-1190.

Cossum PA, Truong L, Cummins L, Owens SR, Markham PM, Shea JP, Crooke S. Pharmacokinetics of ^{14}C Labeled Phosphorthioate Oligonucleotide ISIS 2105 After Intradermal Administration to Rats. *J Pharm Exp Ther* (in print) 1993.

Kheterpal VK, Markham PM, Ziemniak JA. Dispositional Characteristics of a Tyrosine Kinase Inhibitor (RG 14620) in Rats and Rabbits Following Intravenous Administration or Dermal Application. *Drug Metabolism and Disposition* 1993, 22(2):216-223.

Nomeir AA, Markham PM, Chadwick M. Pulmonary Absorption and Disposition of [^{14}C]Thiophene in Rats Following Nose-only Inhalation Exposure. *J Tox. and Env. Health* 1993, 39:223-236.

Nomeir AA, Markham PM, Ghanayem BI, Chadwick M. Disposition of the Flame Retardent 1,2-Bis(2,4,6-Tribromophenoxy)ethane in Rats Following Administration in the Diet. *Drug Metabolism and Disposition* 1993, 21(2):209-214.

Nomeir AA, Markham PM, Mongan AL, Silveira DM, Chadwick M. Effect of Dose on the Percutaneous Absorption of 2- and 4-Chloronitrobenzene in Rats. *Drug Metabolism and Disposition* 1992, 20(3):436-439.

Markham, P.M. Quantitation and toxicological effects of PCBs in estuarine sediments. Amherst, Massachusetts: University of Massachusetts, Masters Thesis, 1987.

Abstracts

Markham P.M., M. Chadwick, A. Mongan and A. Nomeir. Disposition and metabolism of [^{14}C]1,2-bis-(2,4,6-tribromophenoxy)ethane (FF-680) in male Fischer 344 rats following administration in the diet. *The Toxicologist* 11(1):289, 1991.

Nomeir, A., P.M. Markham, N. Ferrala, D. Silveira, M. McComish, B. Ghanayem and M. Chadwick. Comparative metabolism and disposition of [^{14}C]glycidol following p.o. and i.v. administration to male Fischer 344 rats. *The Toxicologist* 11(1):272, 1991.

Mongan, A., D. Silveira, P.M. Markham, M. Chadwick and A. Nomeir. Effect of dose on the absorption of [^{14}C]2- and 4-chloronitrobenzene (2- and 4-CNB) following dermal application to male Fischer 344 rats. *The Toxicologist* 11(1):1117, 1991.

McComish, M.F., D.M. Silveira, P.M. Markham, N.F. Ferrala and M. Chadwick. Effect of repeated dosing and age on the disposition and metabolism of 2-chloronitrobenzene (2-CNB) in male Fischer-344 rats following oral administration. *The Toxicologist* 10:937, 1990.

Silveira, D.M., M.F. McComish, N.F. Ferrala, P.M. Markham and M. Chadwick. Effect of repeated dosing and age on the disposition and metabolism of 4-chloronitrobenzene (4-CNB) in male Fischer-344 rats following oral administration. *The Toxicologist* 10:937, 1990.

Silveira, D.M., P.M. Markham, M.F. McComish, A.A. Nomeir and M. Chadwick. Effect of dose on the disposition and metabolism of 4-chloronitrobenzene (4-CNB) in male Fischer-344 rats following oral administration. *The Toxicologist* 9:86, 1989.

Nomeir, A.A., P.M. Markham and M. Chadwick. Disposition and metabolism of 14C-thiophene in male Fischer-344 rats following nose-only inhalation. *The Toxicologist* 9:83, 1989.

Markham, P.M. and B. Tan. *In vitro* hepatic metabolism of B[a]P by winter flounder *(Pseudopleurenetes Americanus);* dose-effect relationship for environmental exposure to PCB-contaminated sediments. 11th Intl. Symposium on Polynuclear Aromatic Hydrocarbons, 1987.

genzyme TSI transgenics

BioDevelopment Laboratories

NAME: **JOSEPH SWINIARSKI**

ADDRESS:

Home
56 Felt Street
Salem, MA 01970
508.744.9434

Business
BIODEVELOPMENT Laboratories, Inc.
30 Memorial Drive
Cambridge, MA 02142
617.441.1023

FAMILY: Born 2/1/38; married to Louise Boyle Swiniarski of Salem; 2 children, Stephen of Brewster MA and Michael of Carbondale IL.

POSITION: Senior Scientist / Radiation Safety Officer

ASSOCIATION: BIODEVELOPMENT Laboratories, Inc. (former Arthur D. Little, Inc. Life Science Section now wholly owned by Genzyme Transgenics Corporation)

EDUCATION: M.A., 1974, Boston University, Boston, Mass.; 1969-1974; Physiology, major; Radiation Biology, minor

Tufts University Graduate School, Dept. of Virology, Boston, Mass; 1961-1962; Virology, major; Biochemistry, minor

B.S., 1961, Northeastern University, Boston, Mass.; 1958-1961;Biology, major; Chemistry, minor

Massachusetts Institute of Technology, Cambridge, Mass.; 1955-1957; Chemical Engineering, Biology.

Salem Classical & High School, Salem, Mass. 1951-1955

WORK HISTORY: Biodevelopment Laboratories, Inc., Cambridge, Mass.; 1993-

Arthur D. Little, Inc., Cambridge, Mass.; 1963-1993

Tufts University Medical School, Boston, Mass. 1961-1963

Arthur D. Little, Inc., Cambridge, Mass.; 1958-1961

Rybicki Inc., Salem, Mass; 1954-1959

120639

AREAS OF RESPONSIBILITY

Mr. Swiniarski is a Senior Scientist in the Toxicology Section of BIODEVELOPMENT Laboratories, Inc. He is a project leader and study director for commercial and government contract toxicologic, radiologic and experimental therapeutics studies. He is also the Company's radiation protection officer and controlled substances manager.

RELEVANT EXPERIENCE:

Mr. Swiniarski has more than 35 years' experience in the fields of experimental cancer therapeutics, radiation biology, toxicology and veterinary care. His primary research interests include development of novel therapeutics agents and the optimization of their effectiveness have required involvement in safety and health issues as well as efficacy testing.

Radiation biology: Mr. Swiniarski has more than 25 years' experience in the field of radiation biology. He supervises the operation of the Company's sealed source irradiators and has participated in several large projects involving in-vivo and in-vitro models of radioprotection or radiosensitization for the National Cancer Institute and the U.S. Army. These studies included detection and detailed evaluation of new radioprotective agents, detection and detailed evaluation of radiosensitizing agents for anti-tumor therapy. Mr. Swiniarski has led studies for U.S.-based companies evaluating physiologic, toxicologic and tumor-specific effects of non-ionizing radiation, in the visible and ultraviolet spectrum, and of pulsed electromagnetic fields.

- Quality Assurance team leader for DOE baseline audit of Savannah River Ecology Laboratory at Savannah River Site, Aiken, South Carolina, August-September 1993.

- Quality Assurance team leader for DOE Tiger Team Assessment of Naval Petroleum and Oil Shale Reserves in Colorado, Utah and Wyoming, June-August 1992.

- Quality Assurance team member for the DOE Tiger Team Assessment of Idaho National Engineering Laboratory, Idaho Falls, Idaho, June-August 1991.

- Quality Assurance team leader for DOE Tiger Team Assessment of Energy Technology Engineering Center, Santa Susanna Field Center, Ventura County, California, March-April 1991.

- Quality Assurance team leader for DOE Tiger Team pre-site-visit assessment of Laramie Energy Technology Center, Laramie, Wyoming, November 1991.

- Quality Assurance team leader for DOE Tiger Team pre-site-visit assessment of the Oak Ridge Gaseous Diffusion Plant, Oak Ridge, Tennessee, October 1991.

- Managed U.S. Army contract, DAMD17-80C-0143, 1980-1985, at Arthur D.Little, Inc., for the in vivo evaluation of radioprotective agents.

- For the U.S. National Cancer Institute, contract NO1-CM-07257 team member for detailed evaluation of antineoplastic agents and radiosensitizing agents.

- Consultant and experimental preclinical therapeutic and toxicologic scientist (1963-present) with broad experience in cancer research, toxicology, laboratory management, radiation biology and quality assurance monitoring within the present Company (formerly Arthur D. Little, Inc. Chemical and Life Science Section).

- Managed Arthur D. Little, Inc. veterinary service and animal laboratories (1984-1989). Responsibilities included assurance of compliance with U.S. National Institutes of Health guidelines, U.S. Department of Agriculture regulations, U.S Food and Drug Administration regulations, U.S Environmental Protection Agency regulations, U.S. Nuclear Regulatory Commission regulations, Commonwealth of Massachusetts Department of Public Health regulations, and U.S.National Toxicology Program requirements for barrier toxicology testing facilities.

- Site emergency coordinator for the Company's pharmaceutical research and testing laboratories and veterinary facilities for compliance with federal and state regulations 40 CFR 265.5 and 310 CMR 30.520, 1990 - present.

- Evaluated quality assurance capabilities and good laboratory practices compliance for testing laboratories of a major U.S. cosmetics company.

ASSOCIATED EXPERIENCE

- *Experimental anti-neoplastic therapeutics:* The Experimental Therapeutics Unit conducted studies sponsored by the National Cancer Institute to screen for new anti-neoplastic agents, investigate combined therapeutic modalities, and search for improved analogues of known therapeutic agents. Over a 25-year period, tens of thousands of compounds were tested in a variety of transplantable tumor systems. Mr. Swiniarski was responsible for conduct of these studies, including dose preparation and administration, tumor maintenance and transplantation, surgical manipulation, data collection and analysis, and report production and presentation. He has supervised the administration of dose formulations and tumor cell suspensions through intravenous, intraperitoneal, subcutaneous, and intramuscular routes, and the periodic collection of tissue biopsy samples in surgical contexts and blood

samples from retro-orbital sinus, venous, arterial and cardiac routes. Using rodent and human xenograft tumor models, Mr. Swiriarski has evaluated the anti-tumor efficacy of natural and synthetic products for commercial clients from the biotech, chemical and pharmaceutical industries.

- *Toxicity studies:* For government and commercial clients, Mr. Swiniarski evaluates the safety and efficacy of chemicals, biologics and medical devices. Projects, described above, investigating the potential anti-neoplastic activity of therapeutic agents and their analogs for the National Cancer Institute included studies with parallel groups of normal and tumor-bearing animals for determination of the therapeutic indices of these materials. For the NTP, Mr. Swiniarski participated in studies conducted under Master Agreement Order NO1-ES-85221. In the past 10 years, he has led or participated in acute, sub-chronic and chronic pre-clinical toxicologic studies for over 30 commercial clients. In addition to evaluating, for these clients, the safety and efficacy of chemicals, pharmaceuticals and biologics in the usual spectrum of rodent, lagomorph, canine and non-human primate species recommended by regulatory agencies he has also evaluated other modalities, some examples of which are:

  Evaluation, in sheep, of a plasmapheresis device for a filter manufacturer
  Evaluation, in rabbits, of a hollow-fiber-immobilized-protein cartridge blood filtration device for a major chemical company

  Evaluation, in sheep, of a synthetic mat to control hemorrhage from liver during surgical procedures for a biotech company

  Evaluation, in rats, of the adhesion-preventing properties of an agent applied during abdominal surgery for a biotech company

PROFESSIONAL AFFILIATIONS:

- American Association for Cancer Research
- American Association for the Advancement of Science
- New York Academy of Sciences
- Health Physics Society
- New England Chapter Health Physics Society
- American Association for Laboratory Animal Science

- Laboratory Animal Management Association
- Massachusetts Society for Medical Research, Advisory Board Member, 1988-1991

COMMITTEES and OFFICES:

- BDL Radiation Protection Officer, 1993 - present date
- BDL Controlled Substances Officer, 1993 - present date
- BDL Radiation Safety Committee, 1993 - present date
- BDL Site Emergency Coordinator, 1st Alternate, 1993 - present date
- BDL Animal Care and Use Committee, 1993 - present date
- ADL Radiation Safety Committee, 1978 - 1993
- ADL Site Emergency Coordinator, 1st Alternate. 1990 - 1993
- ADL Safety Policy Committee, 1980 - 1993
- ADL Animal Care and Use Committee, member 1982 - 1993, Chairman, 1984-1989
- ADL Biohazard Safety Committee, 1982 - 1993,

ADDITIONAL TRAINING:

- Case Management and Advanced Presentation Skills: Senior Consultant Training: Case Management Skill Block, May 1993; Arthur D. Little, Inc. Environmental Health and Safety Staff Training Program
- Hazardous Materials and Wastes Health and Safety (Hazwoper), March 1994; Arthur D. Little, Inc. Center for Environmental Assurance
- Hazardous Materials and Wastes Health and Safety (Hazwoper), April 1993; Arthur D. Little, Inc. Center for Environmental Assurance
- Hazardous Materials and Wastes Health and Safety (Hazwoper), April 1992; Arthur D. Little, Inc. Center for Environmental Assurance
- Hazardous Materials and Wastes Health and Safety (Hazwoper), May

1991; Arthur D. Little, Inc. Center for Environmental Assurance

- o Environmental,Health and Safety Auditing Skills and Techniques, March 1991; Arthur D. Little, Inc. Center for Environmental Assurance
- o Hazardous Materials, Chemicals and Waste Management and Compliance Seminar, November 1990; Transportation Skills Programs, Inc.
- o Hazardous Materials and Waste Train-the Trainer Seminar, November 1990; Transportation Skills Programs, Inc.
- o Psychological Well-Being of Captive Primates, September 1988; Harvard Medical School Department of Continuing Education, Boston, Mass.
- o Management of Compliance with new Federal Regulations on Care and Use of Animals in Research, April 1986; NIH Workshop; Harvard Medical School Department of Continuing Education, Boston, Mass.
- o Safe Handling of Chemical Carcinogens, September 1981; NIH Short Course; Massachusetts General Hospital, Boston, Mass.

Publications:

Grimm MS, Palmer V, Swiniarski JK, Matier WL, and Peetermans J. Cataract incidence in the rabbit gamma radiation cataract model. Association for Research in Vision and Ophthalmology. 1995 (abstract)

Clement JJ, Burres N, Jarvis J, Chu D, Swiniarski J and Alder J. Biological characterization of a novel quinolone. Cancer Research 1995; 55:830-835

Shtern F, Garrido L, Compton C, Swiniarski JK, Buxton RB, Lauffer RB, Brady TJ. MR imaging of blood-borne liver metastases in mice: contrast enhancement with Fe(EHPG). Radiology 1991; 178 Number 1:83-89

Shtern F, Garrido L, Compton C, Swiniarski JK, Buxton RB, Lauffer RB, Brady TJ. MR imaging of liver tumors in mice: contrast enhancement with Fe(EHPG). 73rd Scientific Assembly of the Radiological Society of North America, November 29-December 4, 1987 (Abstr)

Shtern F, Garrido L, Compton C, Swiniarski JK, Buxton RB, Lauffer RB, Brady TJ. MR imaging of liver tumors in mice: contrast enhancement with Fe(EHPG). Society of Magnetic Resonance in Medicine 6th Annual Meeting, New York, NY, August 17-21, 1987 (Abstr)

Shtern F, Khaw BA, Swiniarski JK, Brady T, Rubin RH, Strauss HW. Tumor detection with non-specific FC-receptor binding human polyclonal IgG. Society of Nuclear Medicine 34th

Annual Meeting. Toronto, Canada, June 1987 (Abstr)

Tyagi AK, Cooney DA, Jayaram HN, Swiniarski JK, Johnson RK. Studies on the mechanism of resistance of selected murine tumors to L-alanosine. Biochem Pharmacol 1981; 30:915-24

Jayaram HN, Cooney DA, Swiniarski J, Johnson RK. Studies on the mechanism of resistance to L-[αS-5S]-α-amino-3-chloro-4,5-dihydro-5-isoxazoleacetic acid (Acivicin). Proc Am Assoc Cancer Res 1980; 21:292 (Abstr)

Johnson RK, Swiniarski J, Cooney DA. L-alanosine and 6-thioguanine: reciprocal collateral sensitivity and therapeutic synergism in combination. Proc Am Assoc Cancer Res 1979; 20:220 (Abstr 891)

Wodinsky I, Clement JJ, Swiniarski J, Skura A. Combined therapy with an aziridine derivative NSC 200724 (AB182) and radiation on an experimental leukemia. Int J Radiat Oncol Biol Phys 1979; 5:1677-80

Johnson RK, Wodinsky I, Swiniarski J, Meaney KF, Clement JJ. Interaction of γ-radiation with two new antineoplastic agents. Aziridinylbenzoquinone (AZQ) and 4'-(acridinylamino)-methanesulfon-m-anisidide (AMSA), in murine tumors in vivo. Int J Rad Oncol Biol Phys 1979; 5:1607-9

Wodinsky I, Swiniarski J, Venditti JM, Johnson RK. The effectiveness of sequential therapy schedules with adriamycin and cyclophosphamide in the P388 leukemia model. In: Hellman K, Connors TA, eds. Chemotherapy: proceedings of the IXth international congress of chemotherapy, vol 8. New York: Plenum Press. 1976:63-76

Merker PC, Swiniarski J. Response of Ridgway osteogenic sarcoma (ROS) and Lewis lung carcinoma (LL) to delayed localized treatment with co-γ-radiation. Fed Proc 1976; 35:786 (Abstr 3196)

Merker PC, Swiniarski J, Wodinsky I, Venditti JM. Co-γ-radiation combined with sarcolysin or adriamycin in delayed treatment of intramuscular (i.m.) Ridgway osteogenic sarcoma. Cancer Res 1976; 17:78

Wodinsky I, Swiniarski JK, Venditti JM. Intramuscularly implanted B16 melanoma as an animal model for combined γ-radiation and chemotherapy studies. Cancer Chemother Rep (Part 2) 1975; 5:59-68

Merker PC, Wodinsky I, Venditti JM, Swiniarski JK. Combined modality therapy: actinomycin D and radiation against the Ridgway osteogenic sarcoma. Cancer Chemother Rep (Part 2) 1975; 5:225-33

Wodinsky I, Swiniarski JK. Antitumor activity of amygdalin MF as a single agent and with β-glucosidase on a spectrum of transplantable rodent tumors. Cancer Chemother Rep (Part 1) 1975; 59:939-50

Wodinsky I, Swiniarski J, Venditti JM. An evaluation of adriamycin (NSC 123127) and cyclophosphamide (NSC 26271) used alone and in sequential combination for the therapy of the murine leukemia L1210. XI Int Cancer Cong, Florence, Italy, October, 1974 (Abstract)

Wodinsky I, Swiniarski J, Kensler CJ, Venditti JM. Combination radiotherapy and chemotherapy of P388 leukemia in vivo. Cancer Chemother Rep (Part 2) 1974; 4:73-97

Wodinsky I, Swiniarski J, Kensler CJ, Venditti JM. Enhanced in vivo activity of combined cis-pt. diamine dichloride (NSC 119875) and γ-radiation therapy. 2d Int Symp Platinum Coordination Complexes in Cancer Chemotherapy. Oxford, England, April, 1973 (Abstract)

Wodinsky I, Swiniarski J, Kensler CJ. Spleen colony studies of leukemia L1210. VII. Combined effects of hydroxyurea (NSC 32065) and γ-radiation on in vivo systems. In: Vaeth JM, ed. Frontiers of radiation therapy and oncology. Vol. 4. Basel/New York: Karger, 1969:79-92

Wodinsky I, Swiniarski J, Kensler CJ. Spleen colony studies of leukemia L1210. IV. Sensitivities of L1210 and L1210/6-MP to triazenoimidazolecarboxamides: a preliminary report. Cancer Chemother Rep 1968; 52:393-8

Wodinsky I, Swiniarski J, Kensler CJ. Spleen colony studies of leukemia L1210. III. Differential sensitivities of normal hematopoietic and resistant L1210 colony-forming cells to 6-mercaptopurine (NSC 755). Cancer Chemother Rep 1968; 52:251-5

Wodinsky I, Swiniarski J, Kensler CJ. Spleen colony studies of leukemia L1210. V. Evaluation of antileukemic agents as determined by the spleen colony and host survival assays. Proc 5th Int Cong Chemother, pp. 423-7, 1967

Wodinsky I, Swiniarski J, Kensler CJ. Differential sensitivities of normal and leukemic bone marrow colony-forming cells to single and divided dose therapy with cytosine arabinoside (NSC 63878). Cancer Res 1967; 8:73 (Abstr)

Wodinsky I, Swiniarski J, Kensler CJ. Spleen colony studies of leukemia L1210. II. Differential sensitivities of normal and leukemic bone marrow colony-forming cells to single and divided dose therapy with cytosine arabinoside (NSC 63878). Cancer Chemother Rep 1967; 51:423-9

Wodinsky I, Swiniarski J, Kensler CJ. Spleen colony studies of leukemia L1210. I. Growth kinetics of lymphocytic L1210 cells in vivo as determined by spleen colony assay. Cancer Chemother Rep 1967; 51:415-21

PAUL A. ZAVORSKAS

Pharmacokinetics Scientist,

EDUCATION:

1984	M.A.,(Biological Sciences), Anna Maria College, Paxton, MA
1974	B.S.,(Microbiology), University of Massachusetts, Amherst, MA

PROFESSIONAL EXPERIENCE:

1994-Present	**Pharmacokinetics Scientist,** Pharmacokinetics Department, TSI Mason Laboratories, Worcester, MA
1991-1994	**Associate Scientist,** Pharmacokinetics Department, TSI Mason Laboratories, Worcester, MA
1988-1991	**Research Associate,** Laboratory of Immunology and Development, Mason Research Institute, Worcester, MA
1986-1988	**Laboratory Manager,** Laboratory of Immunology and Clinical Services, Mason Research Institute, Worcester, MA
1979-1986	**Supervisor,** Laboratory of Immunology and Clinical Services, Mason Research Institute, Worcester, MA
1978-1979	**Supervisor,** Immunology, Mason Research Institute, Worcester, MA
1976-1978	**Laboratory Technician,** Immunology, Mason Research Institute, Worcester, MA

PUBLICATIONS:

1. ESBER, H.J., ZAVORSKAS, P.A., BOGDEN, A.E. and ROSENKRANTZ, H.: Effects of cannabidiol on serum thyroxine levels in adult Rhesus monkeys. Fed. Proc. 38: 1030, 1979.

2. ESBER, H.J., ZAVORSKAS, P.A., LUTHRA, Y.K., ROSENKRANTZ, H., BOGDEN, A.E.: Effects of x-irradiation alone and in combination with antiemetics on serum proteins and immunoglobulin levels in dogs. 80th Ann. Meeting Am. Soc. Microbiol., E72, 1980.

3. ESBER, H.J., ZAVORSKAS, P.A., GOSSELIN, J.R. and BOGDEN, A.E.: Correlation of alpha-lactalbumin synthesis with rat mammary tumor growth. Fed. Proc. 41: 327, 1982.

4. ESBER, H.J., ZAVORSKAS, P. and ROSENKRANTZ, H.: Canine serum protein responses to x-irradiation. Journal of the American College of Toxicology 3: (No. 4) 317, 1984.

5. MATTEO, M.R., ZAVORSKAS, P. and ESBER, H.J.: Tissue distribution and excretion in urine, feces and respiratory CO2 of [14C]-ciclosidomine in beagle dogs. Arzneimittel Forschung/Drug Research 35(I): 329-333, 1985.

6. FARINA, P.R., HOMON, C.A., CHOW, C.T., KEIRNS, J.J., ZAVORSKAS, P.A. and ESBER, H.J.: Radioimmunoassay for clonidine in human plasma and urine using a solid phase second antibody separation. Therapeutic Drug Monitoring 7: 344-350, 1985.

7. ESBER, H.J., LILJA, H.S., ZAVORSKAS, P.A., EASTIN, W., MARONPOT, R.R.: Thyroid hormone and histopathologic responses of Fischer 344 rats and B6C3F1 mice to H.C. Yellow No. 4. Clinical Chemistry 6: 1037, 1987.

8. HOMON, C.A., ESBER, H.J., ZAVORSKAS, P.A., TANSWELL, P.,FARINA, P.R.: A selective radioimmunoassay for the determination of Pirenzepine in plasma and urine. Therapeutic Drug Monitoring 9: 236-242, 1987.

Paul A. Zavorskas

PUBLICATIONS (Continued):

9. ZAVORSKAS, P.A., ESBER, H.J., LILJA, H.S., MURTHY, A.S.K., THOMPSON, M. and KARI, F.: Thyrotoxic response of rats and mice to salicylazosulfapyridine. Fed. Proc. 2: 537, 1988.

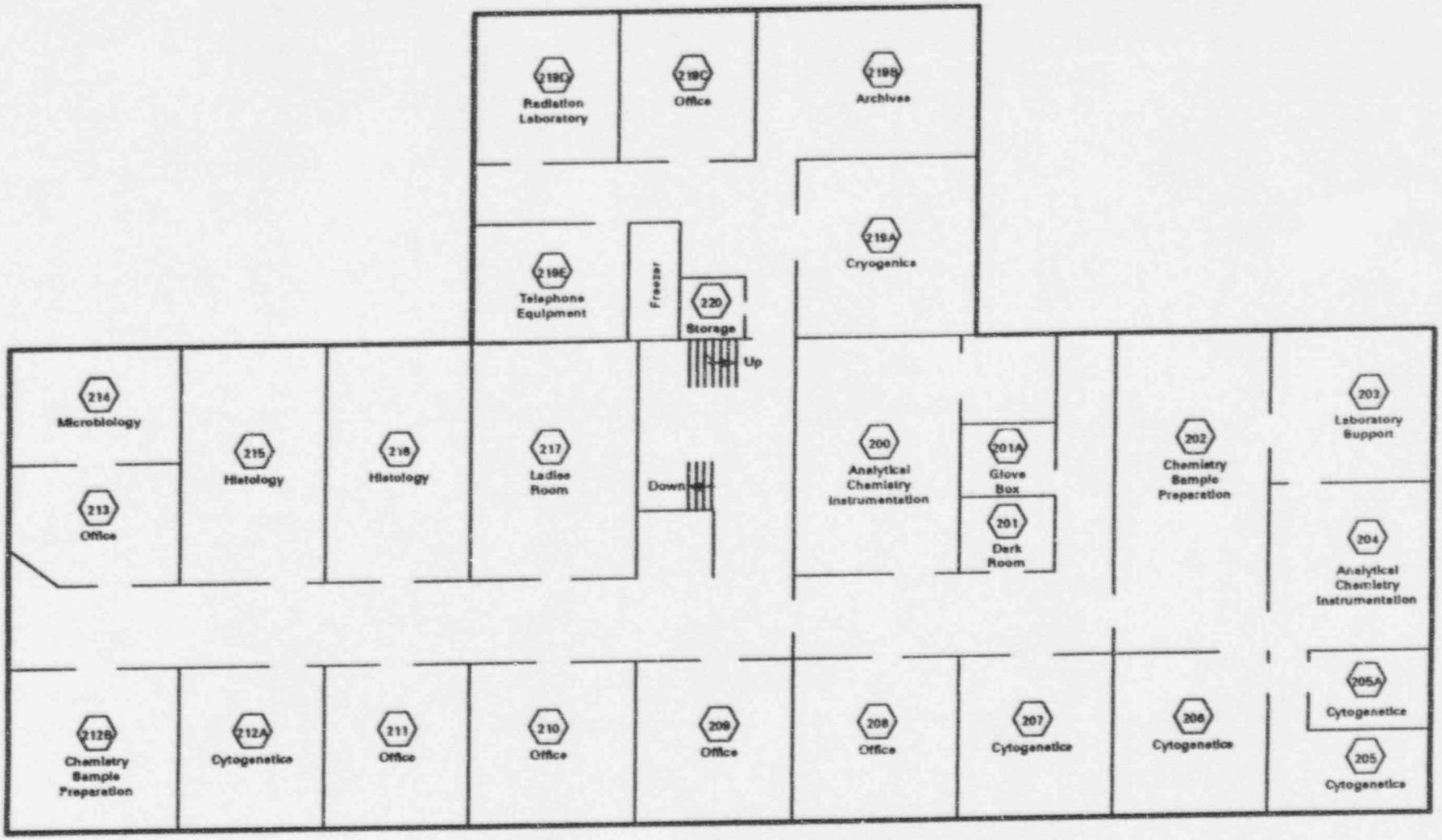
10. ESBER, H.J., ZAVORSKAS, P.A., DeCOURCY, JR. S.J., and BOGDEN, A.E.: Specific *In Vivo* Immune Interaction Between *Staphylococcus aureus* and Gratia Phage. Abstracts of the Annual Meeting of the American Society for Microbiology, E79, 1981.

11. HOMON, C.A, FARINA, P.R., ESBER, H.K., HARRIS, R., ZAVORSKAS, P.A., KEIRNS, J.J.: Radioimmunoassay for Clonidine in Human Plasma, Urine and CSF in the Dog. Clinical Ligand Assay Society, 1986.

US Nuclear Regulatory Commission
Region I Material Section B

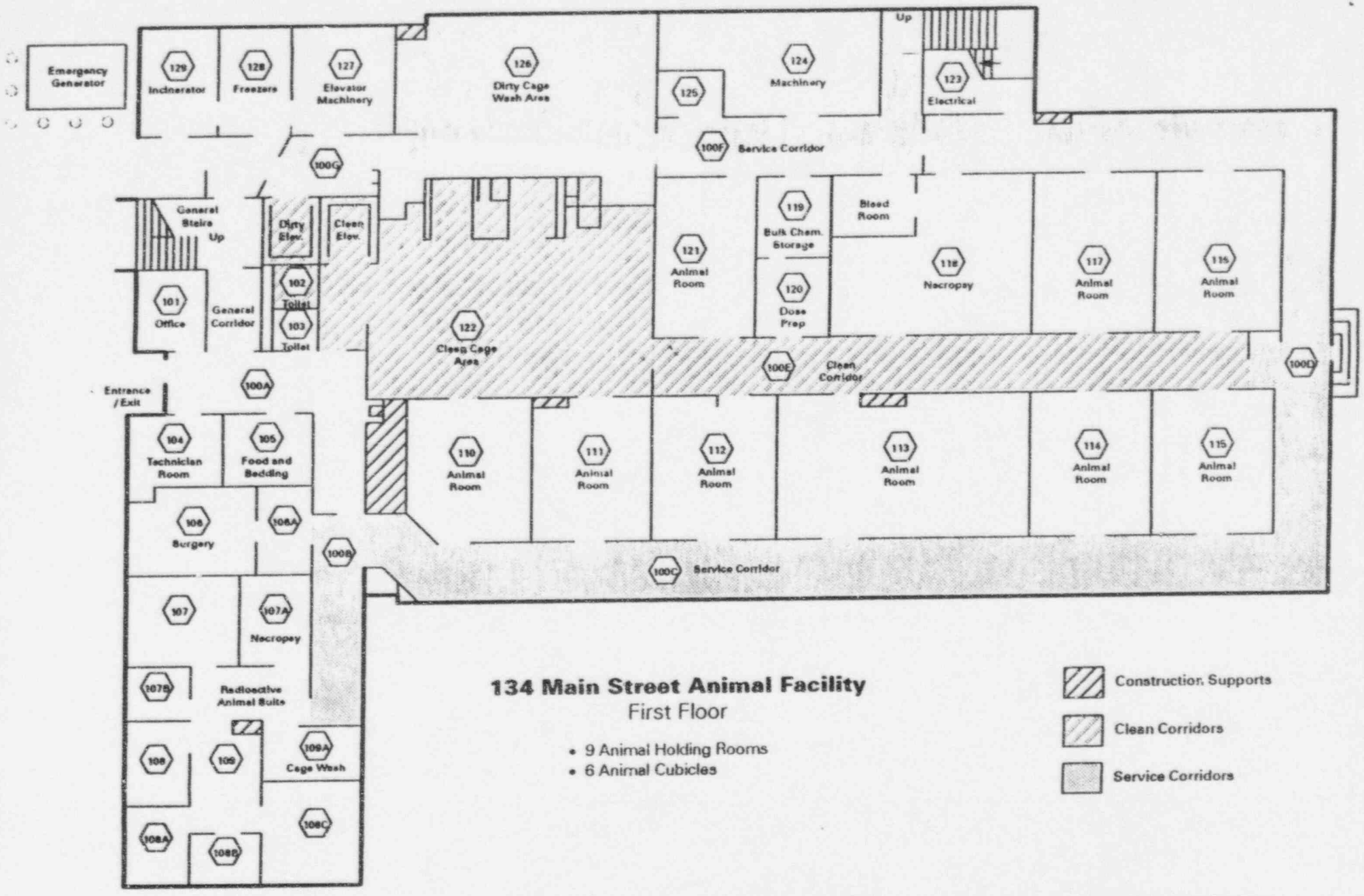
Attachment 3
14 May 1996

Facilities Floor Plans



30 Memorial Drive Laboratories

Second Floor



134 Main Street Animal Facility

First Floor

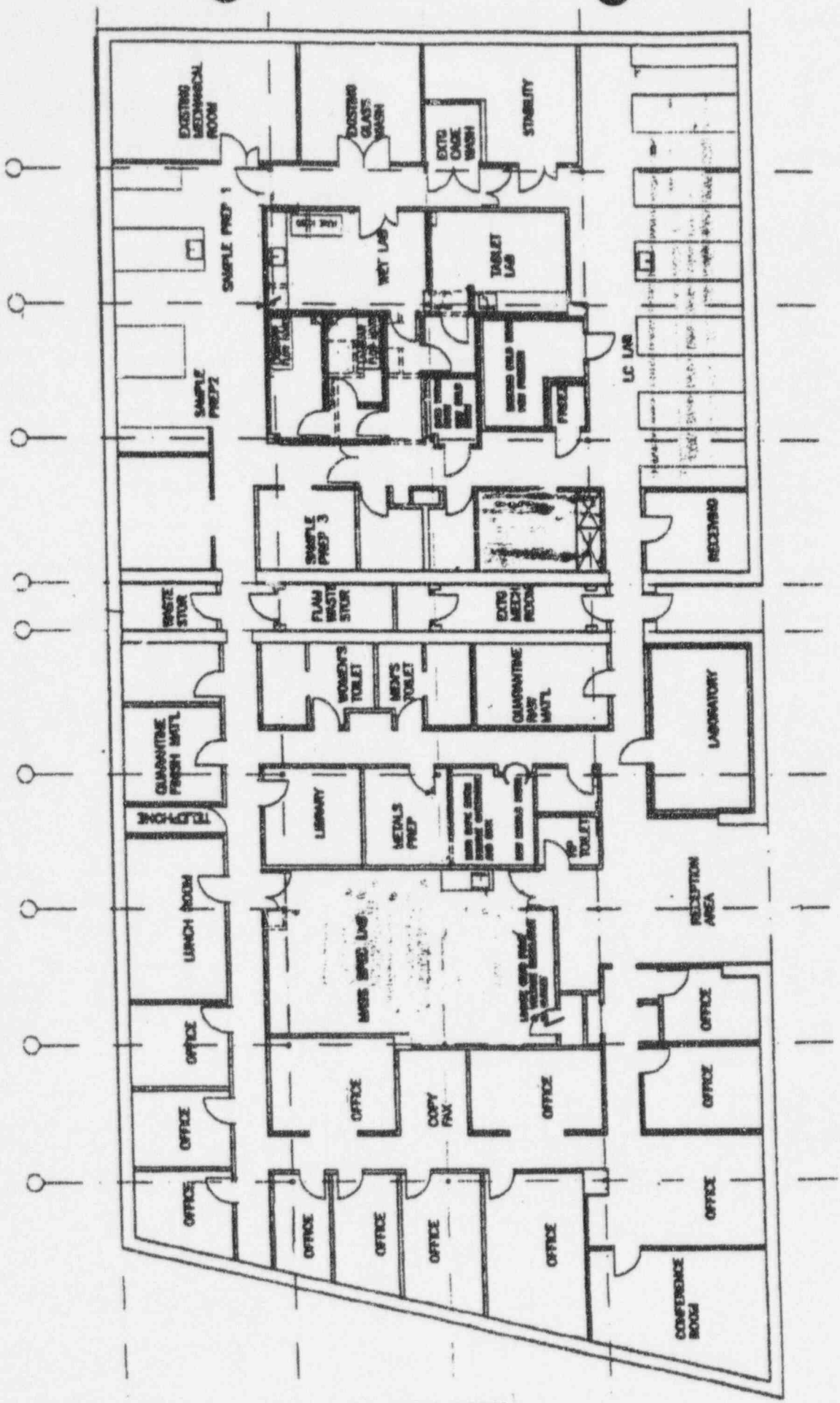
- 9 Animal Holding Rooms
- 6 Animal Cubicles

Construction Supports

Clean Corridors

Service Corridors

DH00682DC592/90702-3



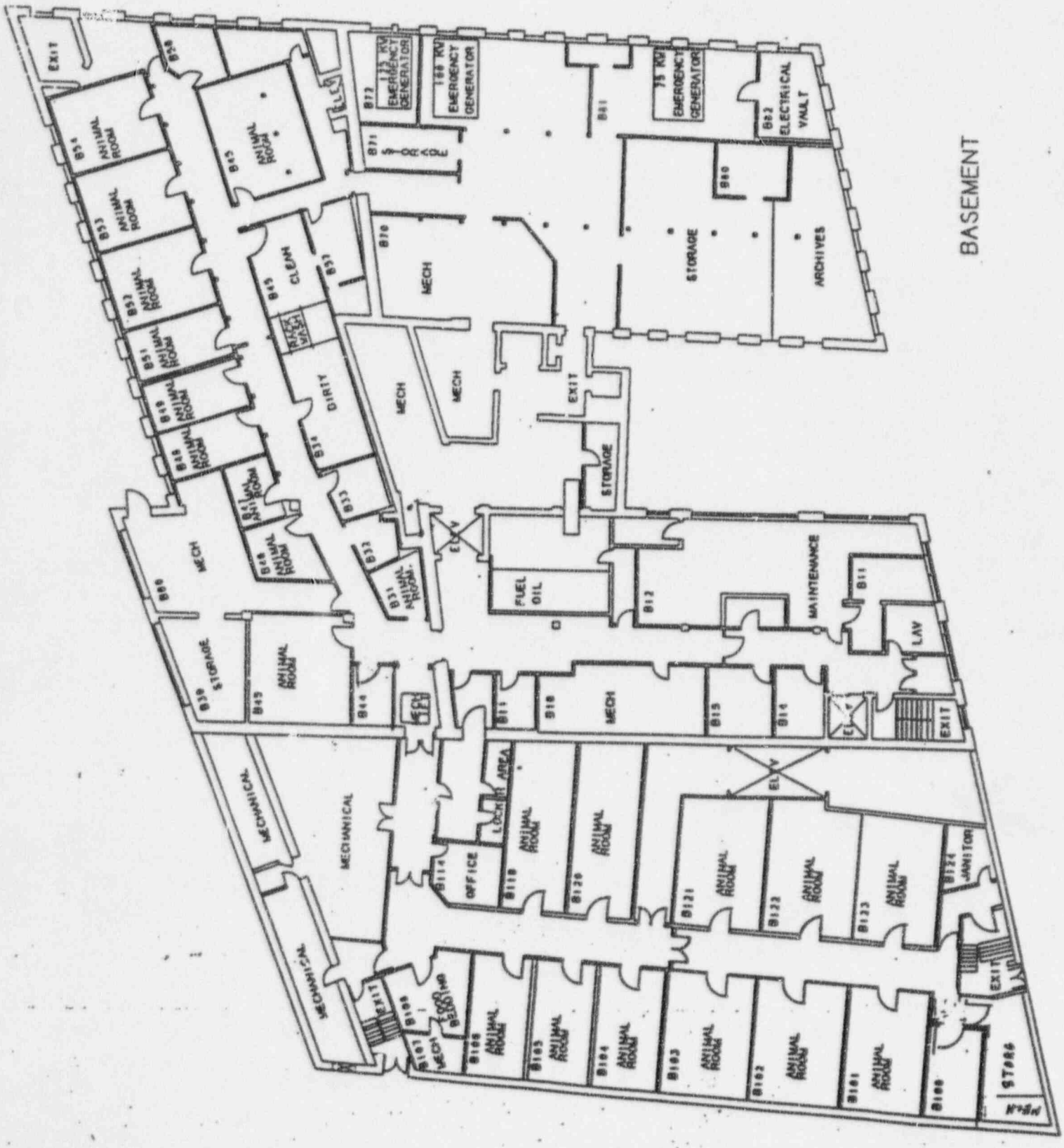
83 Rogers St.

OFFICIAL RECORD COPY ML 10

120639

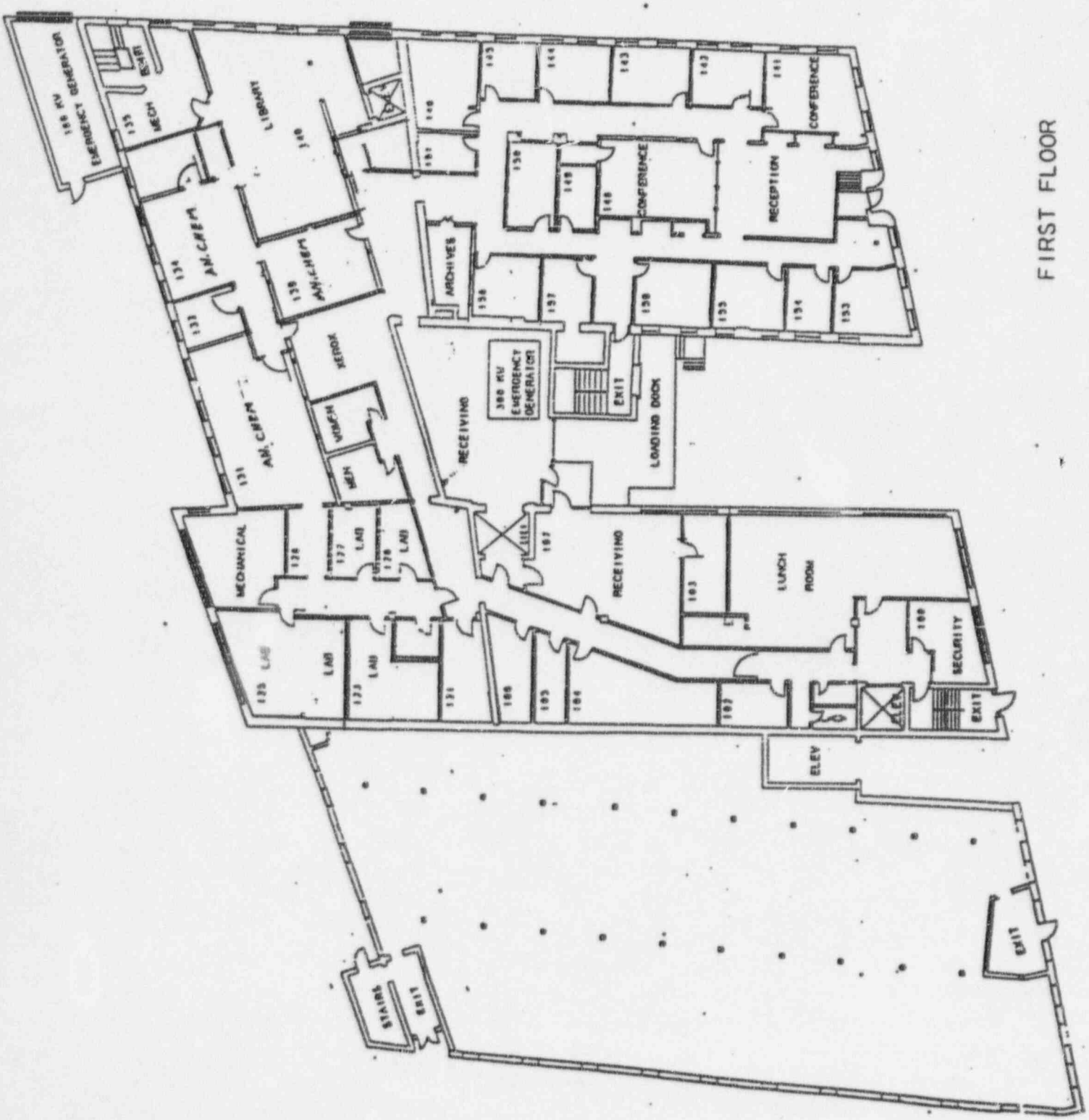
TSI Mason Laboratories

CONFIDENTIAL



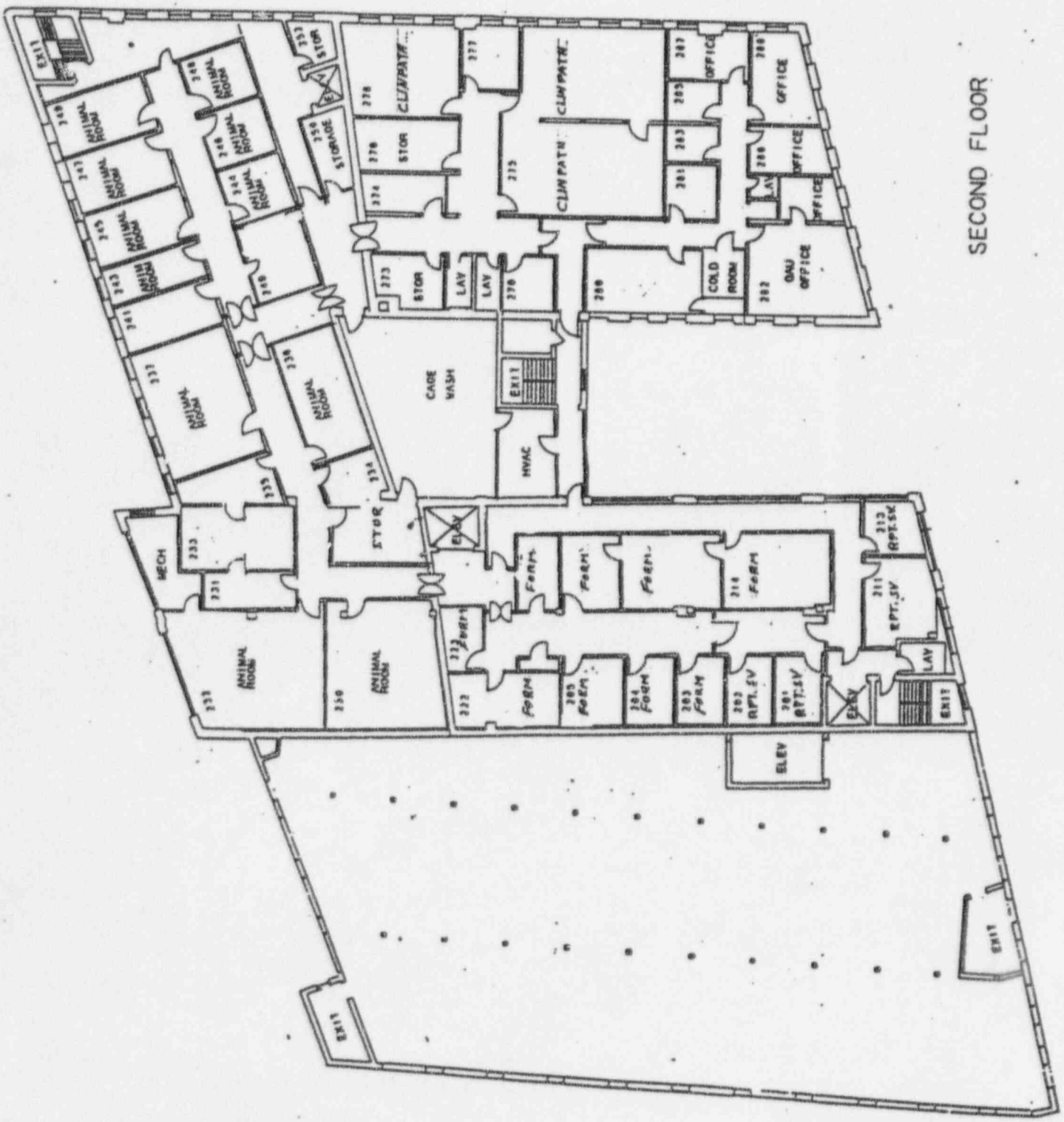
TSI Mason Laboratories

CONFIDENTIAL



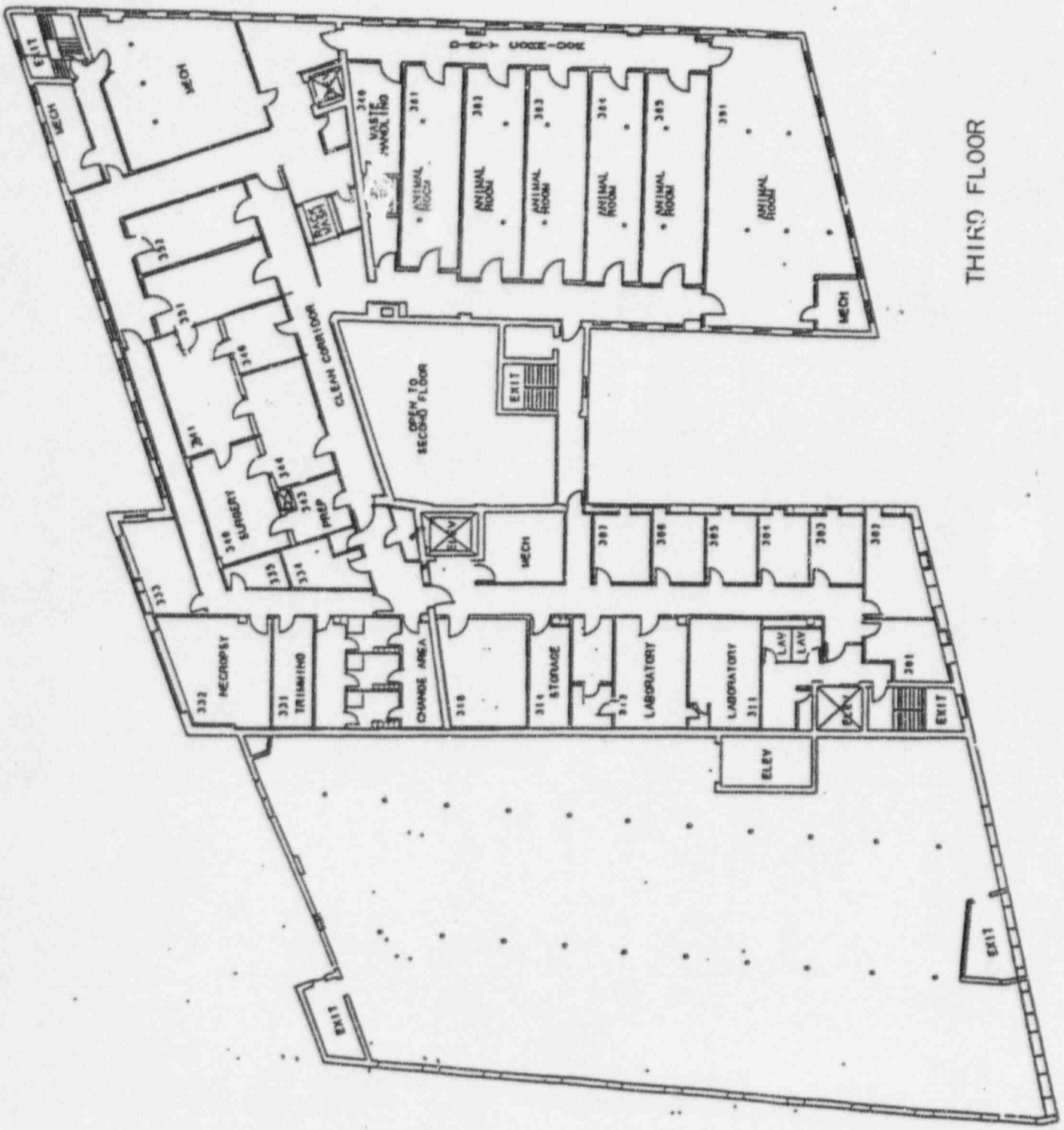
TSI Mason Laboratories

CONFIDENTIAL



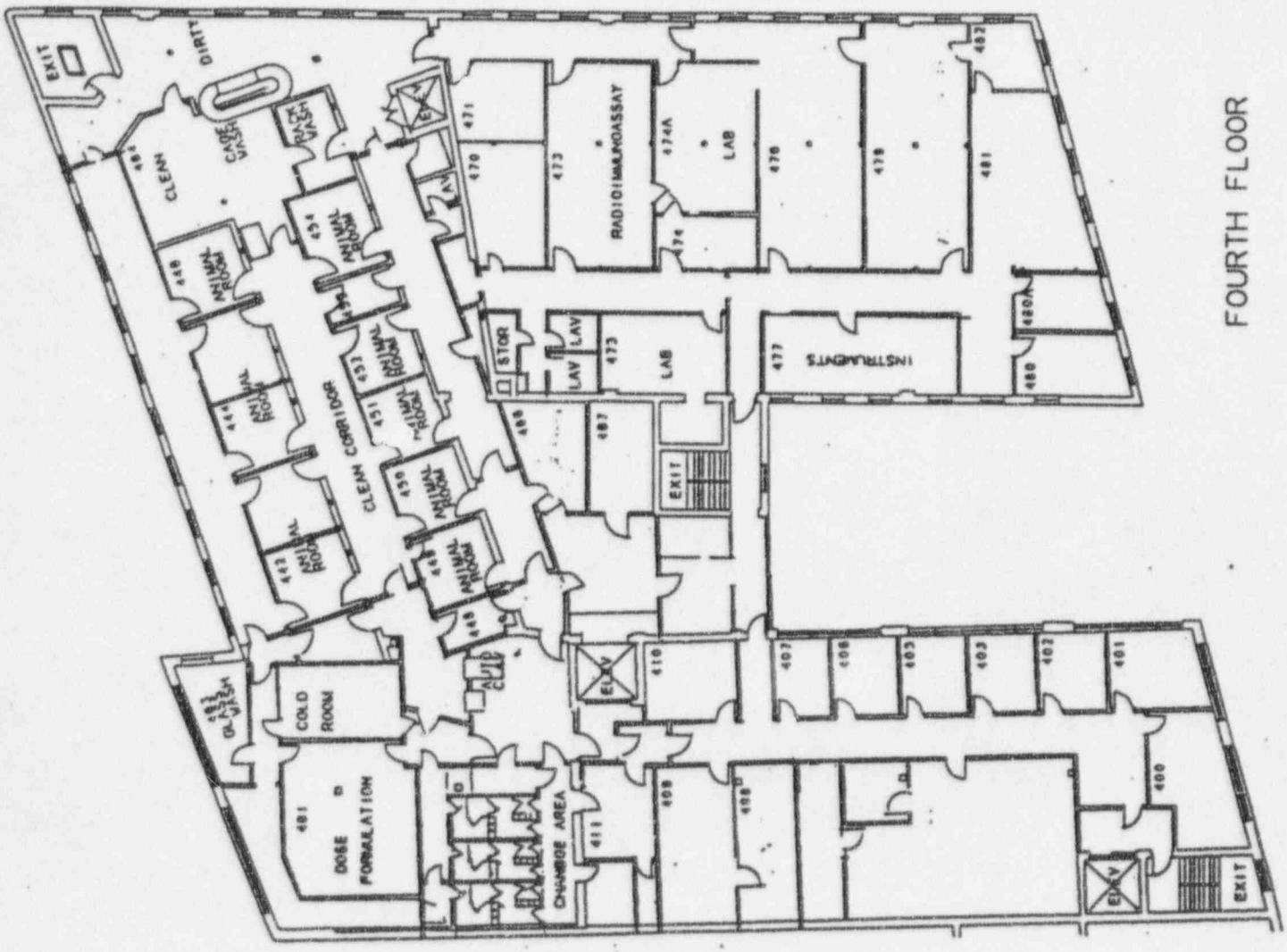
TSI Mason Laboratories

CONFIDENTIAL



TSI Mason Laboratories

CONFIDENTIAL

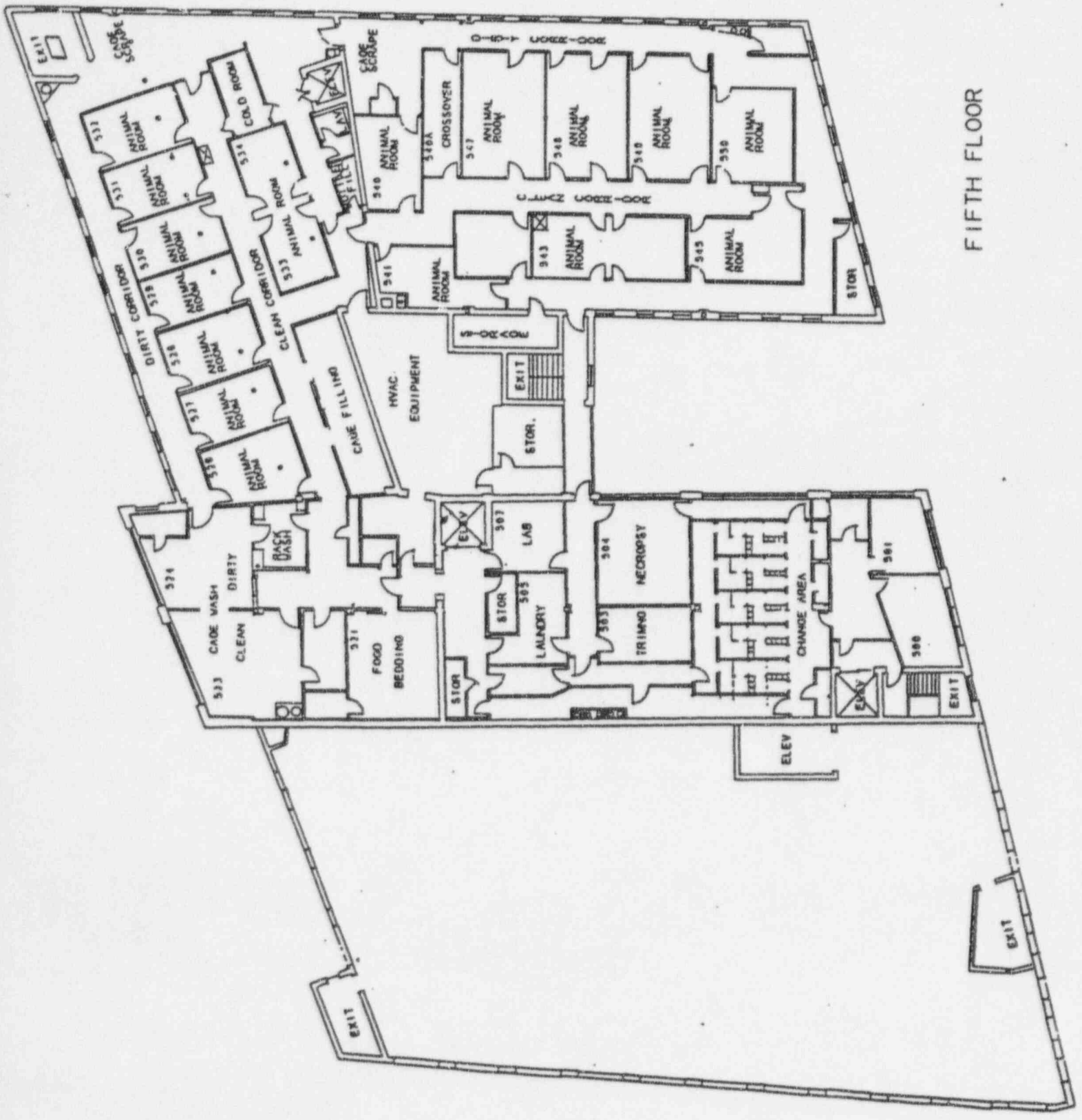


FOURTH FLOOR

NO CORRESPONDING FLOOR SPACE IN ADJACENT BUILDING ON THIS LEVEL

TSI Mason Laboratories

CONFIDENTIAL



US Nuclear Regulatory Commission
Region I Material Section B

Attachment 4
14 May 1996

Radiological Health & Safety Plan Table of Contents

Page

List of Tables

List of Figures

List of Attachments

List of Appendices

120639

MNSB TELEPHONE CONVERSATION RECORD

Person Called: Joseph Swiniarski, RSO **Phone No.:** (617) 441 1023

Person Calling: Sattar Lodhi **Date:** 4-30-96

Facility Name: Biodevelopment Laboratories
Genzyme/Transgenics **Time:** 10:00 a.m.

License No. 20-01489-01 **Docket No.** 030-04605

Subject: License Renewal Application

Summary: I called Mr. Swiniarski to inform him that his response to our letter dated April 16, 1996, was inadequate. We had requested an updated application, but he had submitted just the update of the recent changes in the organization. I informed him that their current license references documents dated back to 1989, and old Part 20. I requested that they submit a new application that also incorporates the changes in the regulatory requirements. He stated that his management also thinks that they should submit a new application and he promised to have the new application sent to RI no later than May 15, 1996.

I am also sending him DG-0005 to help him prepare the application.

Action Required/Taken: Document

Signature: Sattar Lodhi Mail Control No. 120639

OFFICIAL RECORD COPY **ML 10**

genzyme TSI transgenics

BioDevelopment Laboratories

92

15 April 1996

Mr. David Everhart
US Nuclear Regulatory Commission
Region I Material Section B
475 Allendale Road
King of Prussia, Pa 19406

Subject: Up-date of Renewal of By-Product Materials License No. 20-01489-01

Dear Mr. Everhart:

The purpose of this letter is to provide an up-date to our request for a renewal of the subject license.

Genzyme Transgenics Corporation (owner of BIODEVELOPMENT Laboratories, Inc.) wishes to revise the renewal of License No 20-01489-01 to conform with amendment No. 54, dated February 23,1996 (Docket No. 030-04605/030-04692, Control No. 122567), the most recent amendment of our license. A copy of amendment 54 is attached to this letter.

Our original request for renewal (Docket No. 030-04605, Control No. 120639), submitted in October 1994, was based on amendment no. 52. Subsequently, BIODEVELOPMENT Laboratories Inc. was acquired by Genzyme Transgenics Corporation and this and other changes were incorporated into the license via amendments 53 (Control No. 119751) and 54 (Control No. 122567).

Amendment 54 incorporated changes primarily to the licensee name and address, possession limits and location of use.

The licensee is Genzyme Transgenics Corporation whose president and chief executive officer is James Geraghty. The Company's corporate address is:

Genzyme Transgenics Corporation
25 Birch Street
Milford, Massachusetts 01757

Phone: 508.478.0877
Fax: 508.478.1277

120639

OFFICIAL RECORD COPY ML 10

APR 19 1996

US Nuclear Regulatory Commission
Region I Material Section B

The possession limits are described in the attached copy of amendment 54. An escrow account has been established between Genzyme Transgenics Corporation and State Street Bank and Trust Company to provide financial assurance to the NRC.

The locations of use are 30 Memorial Drive (second floor), 134 Main Street and 83 Rogers Street in Cambridge Massachusetts and 57 Union Street, Worcester Massachusetts.

The person to be contacted about this application is

Joseph Swiniarski
BIODEVELOPMENT Laboratories, Inc.
30 Memorial Drive
Cambridge Massachusetts 02142

Phone: 617.441.1023
Fax: 617.441.1010

We would be pleased to provide any additional information regarding our request for renewal that you may need.

Sincerely yours

Joseph Swiniarski
Senior Scientist/RSO

cc: Mr. Sattar Lodhi

Enclosures

Amendment No. 54

MATERIALS LICENSE

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

Licensee	
1. Genzyme Transgenics Corporation 2. 25 Birch Street Milford, Massachusetts 01757	In accordance with the letter dated October 27, 1995, 3. License Number 20-01489-01 is amended in its entirety to read as follows: 4. Expiration Date November 30, 1994 (extended) 5. Docket or Reference No. 030-04605/030-04694

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 with Atomic Nos. 3 through 83 and with half lives of 120 days or less	A. Any	A. Not to exceed 10 millicuries per isotope, 1 curie total
B. Any byproduct material with Atomic Nos. 1 through 83 and with half lives greater than 120 days	B. Any	B. See Condition 12
C. Any byproduct material with Atomic Nos. 84 through 95	C. Any	C. See Condition 12
D. Technetium 99m	D. Any	D. 100 millicuries
E. Iodine 125	E. Any	E. 50 millicuries
F. Hydrogen 3	F. Foils (Varian Aerograph Model 022-000104-00)	F. Not to exceed 250 millicuries per foil and 5000 millicuries total

9. Authorized use

A. through E. Research and development as defined in 10 CFR 30.4; animal studies.
F. For use in Varian Aerograph Group I and II gas chromatography device for sample analysis.

CONDITIONS

10. Licensed material may be used only at the licensee's facilities located at 30 Memorial Drive (second floor), 134 Main Street and 83 Rogers Street, Cambridge, MA and 57 Union Street, Worcester, Massachusetts

11. A. Licensed material shall be used by, or under the supervision of, individuals designated in writing by the Radiation Safety Committee, Joseph Swiniarski, Chairperson.

B. The Radiation Safety Officer for this license is Joseph Swiniarski.

12. In addition to the possession limits in Condition 8, the licensee shall further restrict the possession of NRC licensed material to 10^4 times the quantity specified in Appendix B to 10 CFR Part 30 and in accordance with the requirements of 10 CFR 30.35.

13. Licensed material shall not be used in or on human beings.

14. A. Sealed sources and detector cells containing licensed material shall be tested for leakage and/or contamination at intervals not to exceed six months or at such other intervals as are specified by the certificate of registration referred to in 10 CFR 32.210, not to exceed three years.

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 three months.

C. In the absence of a certificate from a transferor indicating that a leak test has been made within six 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 and detector cells 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 transfer 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 test shall be capable of detecting the presence of 0.005 microcurie of radioactive material on the test sample. 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 or detector cell shall be removed immediately from service and decontaminated, repaired, or disposed of in accordance with Commission regulations. The report shall be filed within five days of the date the leak test result is known with the U.S. Nuclear Regulatory Commission, Region I, ATTN: Chief, Nuclear Materials Safety Branch, 475 Allendale Road, King of Prussia, Pennsylvania 19406. The report shall specify the source or detector cell involved, the test results, and corrective action taken.

G. The licensee is authorized to collect leak test samples for analysis by the licensee. Alternatively, tests for leakage and/or contamination may be performed by persons specifically licensed by the Commission or an Agreement State to perform such services.

15. The licensee shall conduct a physical inventory every six months to account for all sealed sources and devices containing licensed material received and possessed under the license.

16. Sealed sources or detector cells containing licensed material shall not be opened or sources removed from source holders by the licensee.

17. The licensee shall not acquire licensed material in a sealed source or device unless the source or device has been registered with the U.S. Nuclear Regulatory Commission pursuant to 10 CFR 32.210 or equivalent regulations of an Agreement State.

18. A. Detector cells containing a titanium tritide foil or a scandium tritide foil shall only be used in conjunction with a properly operating temperature control mechanism which prevents the foil temperatures from exceeding that specified in the certificate of registration referred to in 10 CFR 32.210.

B. When in use, detector cells containing a titanium tritide foil or a scandium tritide foil shall be vented to the outside.

19. The licensee shall not use licensed material in field applications where activity is released except as provided otherwise by specific condition of this license.

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

21. 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. Waste to be disposed of in this manner shall be held for decay a minimum of ten half-lives.

B. Before disposal as ordinary trash, the waste shall be surveyed at the container surface with the appropriate survey instrument 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. A record of each such disposal permitted under this License Condition shall be retained for three 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.

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

23. Pursuant to Sections 20.106(b) and 20.302 of 10 CFR Part 20, the licensee is authorized to dispose of licensed material by incineration provided the gaseous effluent from incineration does not exceed the limits specified for air in Appendix B, Table II of 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 of 10 CFR Part 20.

MATERIALS LICENSE
SUPPLEMENTARY SHEET

License Number: 20-01489-01

Docket or Reference Number: 030-04605

Amendment No. 54

24. 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 Nuclear Regulatory Commission's regulations shall govern unless the statements, representations, and procedures in the licensee's application and correspondence are more restrictive than the regulations.

A. Application dated January 27, 1988
B. Letter received March 17, 1989
C. Letter dated March 22, 1989
D. Letter dated June 16, 1989
E. Letter dated August 1, 1989
F. Letter dated September 1, 1989
G. Letter dated October 18, 1989
H. Letter dated November 8, 1993
I. Letter dated November 9, 1993
J. Letter dated November 20, 1993
K. Letter dated November 23, 1993
L. Letter dated November 24, 1993
M. Letter dated December 2, 1993
N. Letters dated May 16, 1994
O. Letter dated June 17, 1994
P. Letter dated September 26, 1994
Q. Letters dated November 29, 1994
R. Letter dated July 17, 1995
S. Letter dated October 27, 1995

For the U.S. Nuclear Regulatory Commission

Date FEB 23 1996

By M. Shanbaky
Nuclear Materials Safety Branch
Region I
King of Prussia, Pennsylvania 19406

APR 16 1996

License No. 20-01489-01
Docket No. 030-04605
Control No. 120639

James Garrity
Vice President
Genzyme Transgenics Corporation
BIODEVELOPMENT Laboratories
30 Memorial Drive
Cambridge, MA 02142

Dear Mr. Garrity:

This is in reference to the application for renewal of your above listed NRC license. This letter refers to the telephone conversation of April 15, 1996, between Mr. Joseph Swiniarski of your staff and Dr. Sattar Lodhi of this office. From this conversation it is our understanding that we will receive your updated renewal application no later than April 22, 1996. Please inform this office immediately in writing if your understanding is different from ours.

We will continue our review upon receipt of this information. Please reply in duplicate to my attention at the Region I office and refer to Mail Control No. 120639. If you have any technical questions regarding this matter, please call Dr. Sattar Lodhi at (610) 337-5364.

Sincerely,

ORIGINAL SIGNED BY:

John D. Kinneman, Chief
Nuclear Materials Safety Branch 2
Division of Nuclear Materials Safety

License No. 20-01489-01
Docket No. 030-04605
Control No. 120639

cc:
Joseph Swiniarski, Radiation Safety Officer

DOCUMENT NAME: R:\WPS\DLTR\L2001489.01A
To receive a copy of this document, indicate in the box. "C" = Copy w/o attach/encl "E" = Copy w/ attach/encl "N" = No copy

OFFICE	DNMS/RI	N	DNMS/RI	N				
NAME	SLodhi SL		JKinneman					
DATE	04/15/96		04/16/96		04/ /96		04/ /96	

OFFICIAL RECORD COPY ML 10

TELEPHONE CONVERSATION RECORD

DATE: April 15, 1996 **TIME:**

LICENSEE: Biodevelopment Laboratories Inc. Cambridge, MA **License No. New application**

Person Called: Joseph Swiniarski, RSO **Telephone No.** (617) 441 1023

Organization: Same as above

Person Calling: Sattar Lodhi

Subject: Updated Application for Renewal

Summary:

I called Mr. Swiniarski to request the overdue updated application for the renewal of their license. Dave Everhard had been in contact with the licensee and they had promised to send the needed material soon.

Mr. Swiniarski stated that they are in the process of collecting information to submit to the NRC. I reminded him that a long period has elapsed since the material was first requested. He agreed to have the material sent soon. I requested a firm date and he agreed that the supporting material for renewal will be sent to arrive in RI no later than April 22, 1996. I informed him that this conversation will be confirmed in a letter from RI to the head of the laboratories. He provided me the name of Vice President (James Garrity).

Action Required/Taken: Document/Prepare letter

Signature: Sattar Lodhi **Date:** April 15, 1996.

OFFICIAL RECORD COPY **ML 10** 120639

PALMER & DODGE
ONE BEACON STREET, BOSTON, MA 02108-3190

Ralph A. Child
(617) 573-0151
rchild@palmerdodge.com

Telephone: (617) 573-0100
Facsimile: (617) 227-4420

February 6, 1996

BY FAX

David Everhart
Material Licensing Section
Region I
U.S. Nuclear Regulatory Commission
631 Park Avenue
King of Prussia, Pennsylvania 19406

Re: Financial Assurance Arrangements
Genzyme Transgenics Corp. ("GTC"), Biodevelopment Laboratories, Inc. ("BDL"), and TSI Mason Laboratories ("Mason")
Materials License Nos. 20-01489-01, 20-11085-01
Control Nos. 120639, 122497

Dear Mr. Everhart:

As per your request, attached please find a copy of a letter to you dated February 1, 1996 from James Basque, with its attachments.

Very truly yours,

Ralph A. Child

RAC/dmw
Enclosures

cc: James Basque (w/o enc.)

genzyme (TSI) transgenics

BioDevelopment Laboratories

February 1, 1996

Mr. David Everhart
Material Licensing Section
Region I
U.S. Nuclear Regulatory Commission
631 Park Avenue
King of Prussia, Pennsylvania 19406

Dear Mr. Everhart:

Per your request relayed to me by Ralph Child of Palmer & Dodge, attached you will find the following:

1. A copy of letter from Steven Niemi to Frank Costello dated 7/17/95 which was referenced in Denise Hayes' letter dated 10/30/95.
2. A copy of letter from Steven Niemi to Frank Costello dated 10/11/95 which was referenced in Denise Hayes' letter dated 10/30/95.
3. The number assigned to the escrow agreement forwarded to you by Ralph Child on 1/12/96 is **GE3355**.

It is my understanding that these are the final three items required in order to finalize the amendments relative to Materials License Nos. 20-01489-01 and 20-11085-01, Control Nos. 120639 and 122497. Thank you for your help in this matter. Do not hesitate to contact me with any further questions.

Sincerely,

James E. Basque

BioDevelopment Laboratories • 83 Rogers Street • Cambridge, MA 02142 • TEL 617-234-5200 • FAX 617-234-5211

BIODEVELOPMENT Laboratories, Inc.

Helping Clients turn Discoveries into Products

A former division of
Arthur D Little

July 17, 1995

Mr. Frank Costello
U.S. Nuclear Regulatory Commission
Region I
475 Allendale Road
King of Prussia, Pennsylvania 19406

Reference: License No. 20-01489-01
License No. 20-01489-05

Dear Mr. Costello:

This letter will serve as notification of the change in ownership of BIODEVELOPMENT Laboratories, Inc. (BDL). Effective July 3, 1995, ownership has been transferred to Genzyme Transgenics Corporation (GTC), 25 Birch Street, Milford, MA 01757. The operations related License No. 20-01489-01 and License No. 20-01489-01 will remain substantially unchanged from that stated in the current licenses. The following information included with this letter was prepared according to guidance provided by the NRC.

Name of the organization

There will be no change in the name of the organization, BIODEVELOPMENT Laboratories, Inc.

Changes in personnel listed on the licenses

No changes will be occurring to the personnel listed on the licenses. Joseph Swiniarski will continue to serve as the Radiation Safety Officer and the Chairperson of the Radiation Safety Committee.

License Status of the Transferor

The licensed company is being purchased in its entirety and the transferor will not continue in business as a separate entity.

Description of the Transfer

Genzyme Transgenics Corporation has acquired all of the stock of BDL. As a result of the merger, GTC has acquired substantially all of the personal property, business and other tangible and intangible property of BDL and will be continuing the use of the byproduct materials in research work in the currently licensed facilities, namely 30 Memorial Drive (second floor), 134 Main Street and 83 Rogers Street, Cambridge, MA. Substantially all of the policies and procedures currently in place will remain in place under the new ownership.

30 Memorial Drive, Cambridge, MA 02142
Telephone: (617) 441-1000 Fax: (617) 441-1010

Mr. Frank Costello
U.S. Nuclear Regulatory Commission
Region 1

Description of planned changed in organization, location, facilities, equipment, procedures or personnel

Substantially all of the existing organization, location, facilities, equipment, procedures or personnel will remain unchanged as a result of the acquisition. The organization structure of BDL will remain the same with the exception that the managerial organization will now report to Steven M. Niemi, D.V.M., Vice President, U.S. Operations, GTC.

Changes in use, possession or storage of licensed materials.

Use, possession and storage of licensed materials will remain the same.

Status of radiation safety records at the time of transfer

All radiation safety records available for historical use of byproduct material were transferred with the licenses. These records include but are not limited to the following: waste disposal via incineration, sewer disposal, drum disposal, personal dosimetry, wipe testing, leak testing, radiation safety, instrument calibrations, internal audits, and radiation safety committee meetings.

Status of the facility

No decontamination occurred before the transfer. The successor company agrees to assume full liability for the decontamination of the facility or site.

Description of Decontamination Plans, including financial assurance arrangements of the transferee.

No decontamination occurred before the transfer. The successor company agrees to assume full liability for the decontamination of the facility or site. Decommissioning activities, when they occur, will include the performance of a detailed radiation survey to identify residual radiation above NRC recommended release levels on all laboratory surfaces (i.e., benches, floors) and equipment (i.e., hoods, sinks, refrigerators, freezers) as well as inside sink drains and ventilation ductwork. The facilities will be decontaminated through cleaning of loose contamination and removal of fixed contamination so that levels remaining are below NRC recommended release levels.

BDL continues to maintain a Letter of Credit in the amount of $150,000 which amount will constitute sufficient financial assurance pursuant of 10 CFR Part 30.35 for the types and amounts of byproduct set forth in Exhibit C and C-1.

Mr. Frank Costello
U.S. Nuclear Regulatory Commission
Region I

Indication and documentation of whether the transferor and transferee agree to the change in ownership or control of the licensed material and activity

BDL and GTC by submission of this joint notification of change in ownership agree to the change in ownership and control of the by product materials and activity currently governed by the licenses.

Commitment by the transferee to abide by all constraints, conditions, requirements, representations, and commitments identified in the existing licenses

GTC agrees to abide by all constraints, conditions, requirements, representations, and commitments identified in the existing license

If you require any further information with respect to this change in ownership, please do not hesitate to contact Steven M. Niemi at 508-478-0877 ext. 173

Sincerely,

GENZYME TRANSGENICS CORPORATION

Steven M. Niemi, D.V.M.
Vice President, U.S. Operations
Genzyme Transgenics Corporation

Joseph J. Guarnieri, M.B.A.
Formerly President & CEO, BIODEVELOPMENT Laboratories, Inc.

cc: Joseph Swiniarski, RSO, BDL

genzyme TSI transgenics

TSI Corporation
25 Birch Street
Milford, MA 01757
TEL 508.478.0877
FAX 508.478.1277

11 October 1995

Mr. Frank Costello
U.S. Nuclear Regulatory Commission
Region I
475 Allendale Road
King of Prussia, Pennsylvania 19406

RE: License No.: 20-11085-01

Dear Mr. Costello:

This letter will serve as notification of the change in ownership of TSI Mason Laboratories. Effective October 1, 1994, ownership was transferred to Genzyme Transgenics Corporation (GTC), 25 Birch Street, Milford, MA, 01757. The operations related to TSI Mason Laboratories' use and handling of radioactive materials will remain unchanged from those as currently stated on License No. 20-11085-01. The following information was prepared according to NRC Information Notice No. 89-25, March 7, 1989.

Name of Organization

There will be no changes in the name of the organization, TSI Mason Laboratories.

Changes in Personnel Listed on the License

Mr. Paul Zavorskas will continue to serve as TSI Mason's Radiation Safety Officer as is currently listed on License No.: 20-11085-01.

License Status of the Transferor

The licensed company, TSI Mason Laboratories, is being purchased in its entirety and the transferor will not continue in business as a separate entity.

Description of the Transfer

GTC has acquired all businesses and related tangible and intangible property of TSI Corporation of which TSI Mason Laboratories is an operating division. The contract research conducted at TSI Mason will continue in the currently licensed facility located at 57 Union Street, Worcester, MA, 01608. All policies and procedures in place will continue as is under the new ownership.

Description of Planned Changes in Organization, Location, Facilities, Equipment, Procedures or Personnel

No changes are planned in personnel, location, facilities, equipment or procedures. The organizational structure will change in that local senior management will report to Steven M. Niemi, DVM, Vice President, U.S. Operations, GTC.

Changes in Use, Possession or Storage of Licensed Materials

The use, possession and storage of licensed materials will remain unchanged.

Status of Radiation Safety Records at the Time of Transfer

All radiation safety records available for historical use of byproduct material were transferred with the license. These records include but are not limited to: waste disposal via outside carriers, sewer disposal, drum disposal, personal dosimetry, wipe testing, leak testing, radiation safety, instrument calibration, radiation safety training.

Status of Facility

No decontamination occurred before the transfer. GTC agrees to assume full liability for the decontamination of the facility.

Description of Decontamination Plans

No decontamination occurred before the transfer. GTC agrees to accept full liability for the decontamination of the facility. Decommissioning activities, when they occur, will include the performance of a detailed radiation survey to identify residual radiation above NRC recommended release levels on all laboratory surfaces (i.e., benches, floors) and equipment (i.e. hoods, sinks, refrigerators, freezers) as well as inside sink drains and ventilation ductwork. The facility will be decontaminated through cleaning of loose contamination and removal of fixed contamination so that levels remaining are below NRC recommended release levels.

Indications and documentation of Whether the Transferor and Transferee agree to the Change in Ownership or Control of the Licensed Material and Activity

TSI Mason and GTC by submission of this joint notification of change in ownership agree to the change in ownership and control of the byproduct materials and activity currently governed by the license.

Commitment by the Transferee to Abide by all Constraints, Conditions, Requirements, Representations, and Commitments Identified in the Existing License

GTC agrees to abide by all constraints, conditions, requirements, representations, and commitments identified in the existing license.

If you require additional information with respect to this change in ownership, please contact me at your convenience.

Sincerely,

Steven M. Niemi, DVM
Vice President, U.S. Operations

pc: J. Grant, Health and Safety Officer,
TSI Mason Laboratories

ESCROW AGREEMENT BETWEEN
GENZYME TRANSGENICS CORP. AND
STATE STREET BANK AND TRUST COMPANY
TO PROVIDE FINANCIAL ASSURANCE TO
U.S. NUCLEAR REGULATORY COMMISSION

ESCROW NUMBER GE3355

Paragraph 1. Establishment of Escrow Account

It is agreed between the parties that Genzyme Transgenics Corp., licensee (hereinafter, "GTC" or "licensee"), has elected to establish an escrow account with State Street Bank and Trust Company (hereinafter "State Street"or "escrow agent"), Corporate Trust Department, Two International Place, Boston, MA 02110, to provide financial assurance for decommissioning of the facility(ies) in the amounts shown below:

2nd Floor
30 Memorial Drive
Cambridge, MA 02142

83 Rogers Street
Cambridge, MA 02142

134 Main Street
Cambridge, MA 02142

57 Union Street
Worcester, MA 01608

All facilities are under License No. 20-01489-05, as amended. This escrow agreement provides $150,000 in financial assurance, as required.

Paragraph 2. Description of Property in Escrow Account

It is hereby acknowledged by the parties that $150,000 has been delivered to escrow and will remain in the escrow account created by this agreement until one of the two conditions stated in Paragraph 3 of this agreement has been satisfied.

GTC warrants to and agrees with State Street that, unless otherwise expressly set forth in this Agreement: there is no security interest in the property in the escrow account or any part thereof; no financing statement under the Uniform Commercial Code is on file in any jurisdiction claiming a security interest in or describing (whether specifically or generally) the escrow account or any part thereof; and the escrow agent shall have no responsibility at any time to ascertain whether or not any security interest exists or to file any financing statement under the Uniform Commercial Code with respect to the escrow account or any part thereof.

Paragraph 3. Conditions of Escrow Agreement

The property described in Paragraph 2, above, will remain in the escrow account created by this agreement until one of the two following conditions has been satisfied: (1) the decommissioning activities required by 10 CFR 30 have been completed, the license has been

genzyme (TSI) transgenics

BioDevelopment Laboratories

030 - 04605
K2

February 1, 1996

Mr. David Everhart
Material Licensing Section
Region I
U.S. Nuclear Regulatory Commission
631 Park Avenue
King of Prussia, Pennsylvania 19406

Dear Mr. Everhart:

Per your request relayed to me by Ralph Child of Palmer & Dodge, attached you will find the following:

1. A copy of letter from Steven Niemi to Frank Costello dated 7/17/95 which was referenced in Denise Hayes' letter dated 10/30/95.
2. A copy of letter from Steven Niemi to Frank Costello dated 10/11/95 which was referenced in Denise Hayes' letter dated 10/30/95.
3. The number assigned to the escrow agreement forwarded to you by Ralph Child on 1/12/96 is **GE3355**.

It is my understanding that these are the final three items required in order to finalize the amendments relative to Materials License Nos. 20-01489-01 and 20-11085-01, Control Nos. 120639 and 122497. Thank you for your help in this matter. Do not hesitate to contact me with any further questions.

Sincerely,

James E. Basque

BioDevelopment Laboratories • 83 Rogers Street • Cambridge, MA 02142 • TEL 617-234-5200 • FAX 617-234-5211

120639
FEB - 1 1996

OFFICIAL RECORD COPY ML 10

BIODEVELOPMENT Laboratories, Inc.

Helping Clients turn Discoveries into Products

A former division of:
Arthur D Little

July 17, 1995

Mr. Frank Costello
U.S. Nuclear Regulatory Commission
Region I
475 Allendale Road
King of Prussia, Pennsylvania 19406

Reference: License No. 20-01489-01
License No. 20-01489-05

Dear Mr. Costello:

This letter will serve as notification of the change in ownership of BIODEVELOPMENT Laboratories, Inc. (BDL). Effective July 3, 1995, ownership has been transferred to Genzyme Transgenics Corporation (GTC), 25 Birch Street, Milford, MA 01757. The operations related License No. 20-01489-01 and License No. 20-01489-01 will remain substantially unchanged from that stated in the current licenses. The following information included with this letter was prepared according to guidance provided by the NRC.

Name of the organization

There will be no change in the name of the organization, BIODEVELOPMENT Laboratories, Inc.

Changes in personnel listed on the licenses

No changes will be occurring to the personnel listed on the licenses. Joseph Swiniarski will continue to serve as the Radiation Safety Officer and the Chairperson of the Radiation Safety Committee.

License Status of the Transferor

The licensed company is being purchased in its entirety and the transferor will not continue in business as a separate entity.

Description of the Transfer

Genzyme Transgenics Corporation has acquired all of the stock of BDL. As a result of the merger, GTC has acquired substantially all of the personal property, business and other tangible and intangible property of BDL and will be continuing the use of the byproduct materials in research work in the currently licensed facilities, namely 30 Memorial Drive (second floor), 134 Main Street and 83 Rogers Street, Cambridge, MA. Substantially all of the policies and procedures currently in place will remain in place under the new ownership.

30 Memorial Drive, Cambridge, MA 02142
Telephone: (617) 441-1000 Fax: (617) 441-1010

Mr. Frank Costello
U.S. Nuclear Regulatory Commission
Region I

Description of planned changed in organization, location, facilities, equipment, procedures or personnel

Substantially all of the existing organization, location, facilities, equipment, procedures or personnel will remain unchanged as a result of the acquisition. The organization structure of BDL will remain the same with the exception that the managerial organization will now report to Steven M. Niemi, D.V.M., Vice President, U.S. Operations, GTC.

Changes in use, possession or storage of licensed materials.

Use, possession and storage of licensed materials will remain the same.

Status of radiation safety records at the time of transfer

All radiation safety records available for historical use of byproduct material were transferred with the licenses. These records include but are not limited to the following: waste disposal via incineration, sewer disposal, drum disposal, personal dosimetry, wipe testing, leak testing, radiation safety, instrument calibrations, internal audits, and radiation safety committee meetings.

Status of the facility

No decontamination occurred before the transfer. The successor company agrees to assume full liability for the decontamination of the facility or site.

Description of Decontamination Plans, including financial assurance arrangements of the transferee.

No decontamination occurred before the transfer. The successor company agrees to assume full liability for the decontamination of the facility or site. Decommissioning activities, when they occur, will include the performance of a detailed radiation survey to identify residual radiation above NRC recommended release levels on all laboratory surfaces (i.e., benches, floors) and equipment (i.e., hoods, sinks, refrigerators, freezers) as well as inside sink drains and ventilation ductwork. The facilities will be decontaminated through cleaning of loose contamination and removal of fixed contamination so that levels remaining are below NRC recommended release levels.

BDL continues to maintain a Letter of Credit in the amount of $150,000 which amount will constitute sufficient financial assurance pursuant of 10 CFR Part 30.35 for the types and amounts of byproduct set forth in Exhibit C and C-1.

July 17, 1995 Page 3

Mr. Frank Costello
U.S. Nuclear Regulatory Commission
Region I

Indication and documentation of whether the transferor and transferee agree to the change in ownership or control of the licensed material and activity

BDL and GTC by submission of this joint notification of change in ownership agree to the change in ownership and control of the by product materials and activity currently governed by the licenses.

Commitment by the transferee to abide by all constraints, conditions, requirements, representations, and commitments identified in the existing licenses

GTC agrees to abide by all constraints, conditions, requirements, representations, and commitments identified in the existing license

If you require any further information with respect to this change in ownership, please do not hesitate to contact Steven M. Niemi at 508-478-0877 ext. 173

Sincerely,

GENZYME TRANSGENICS CORPORATION

Steven M. Niemi, D.V.M.
Vice President, U.S. Operations
Genzyme Transgenics Corporation

Joseph J. Guarnieri, M.B.A.
Formerly President & CEO, BIODEVELOPMENT Laboratories, Inc.

cc: Joseph Swiniarski, RSO, BDL

PALMER & DODGE
ONE BEACON STREET, BOSTON, MA 02108-3190

Ralph A. Child
(617) 573-0151
rchild@palmerdodge.com

Telephone: (617) 573-0100
Facsimile: (617) 227-4420

January 12, 1996

BY OVERNIGHT MAIL

David Everhart
Material Licensing Section
Region I
U.S. Nuclear Regulatory Commission
631 Park Avenue
King of Prussia, Pennsylvania 19406

Re: Financial Assurance Arrangements
Genzyme Transgenics Corp. ("GTC"), Biodevelopment Laboratories, Inc. ("BDL"), and TSI Mason Laboratories ("Mason")
Materials License Nos. 20-01489-01, 20-11085-01
Control Nos. 120639, 122497

Dear Mr. Everhart:

Enclosed please find an original of the fully executed and fully effective escrow agreement between Genzyme Transgenics Corp. and State Street Bank and Trust Company.

As you know, this escrow agreement is submitted to provide the financial assurance for an amended license to be issued to GTC. The amended license is the license currently held by GTC's subsidiary, BDL, and will also incorporate the license currently held by Mason, another GTC subsidiary. The current Mason license will be retired.

With this submission, my understanding is that the NRC has received all the substantive materials necessary to issue the amended license to GTC and to retire the Mason license, and also to release the two letters of credit (one for BDL and one for Arthur D. Little, Inc.) that provided the financial assurance for the current BDL license. The NRC's prompt turn-around on these requests would be much appreciated.

As we discussed earlier this week, I also understand that GTC has yet to submit the entire fee necessary for processing the pending applications. I also understand that the fee

will be sent to the Fees Branch at the NRC by overnight mail on Monday or Tuesday next week, with a confirming copy direct to you.

Thank you for your expert, cordial, and responsive assistance in this matter.

Very truly yours,

Ralph A. Child

RAC/dmw
Enclosure

cc: John Green, GTC (w/enc. of duplicate original)
Jim Basque, BDL (w/enc. of copy)
Denise Hayes, BDL (w/enc. of copy)
Deborah J. Gauthier, State Street (w/enc. of copy)
Beth Saunders, ADL (w/enc. of copy)

ESCROW AGREEMENT BETWEEN
GENZYME TRANSGENICS CORP. AND
STATE STREET BANK AND TRUST COMPANY
TO PROVIDE FINANCIAL ASSURANCE TO
U.S. NUCLEAR REGULATORY COMMISSION

ESCROW NUMBER _____

Paragraph 1. Establishment of Escrow Account

It is agreed between the parties that Genzyme Transgenics Corp., licensee (hereinafter, "GTC" or "licensee"), has elected to establish an escrow account with State Street Bank and Trust Company (hereinafter "State Street"or "escrow agent"), Corporate Trust Department, Two International Place, Boston, MA 02110, to provide financial assurance for decommissioning of the facility(ies) in the amounts shown below:

2nd Floor
30 Memorial Drive
Cambridge, MA 02142

83 Rogers Street
Cambridge, MA 02142

134 Main Street
Cambridge, MA 02142

57 Union Street
Worcester, MA 01608

All facilities are under License No. 20-01489-05, as amended. This escrow agreement provides $150,000 in financial assurance, as required.

Paragraph 2. Description of Property in Escrow Account

It is hereby acknowledged by the parties that $150,000 has been delivered to escrow and will remain in the escrow account created by this agreement until one of the two conditions stated in Paragraph 3 of this agreement has been satisfied.

GTC warrants to and agrees with State Street that, unless otherwise expressly set forth in this Agreement: there is no security interest in the property in the escrow account or any part thereof; no financing statement under the Uniform Commercial Code is on file in any jurisdiction claiming a security interest in or describing (whether specifically or generally) the escrow account or any part thereof; and the escrow agent shall have no responsibility at any time to ascertain whether or not any security interest exists or to file any financing statement under the Uniform Commercial Code with respect to the escrow account or any part thereof.

Paragraph 3. Conditions of Escrow Agreement

The property described in Paragraph 2, above, will remain in the escrow account created by this agreement until one of the two following conditions has been satisfied: (1) the decommissioning activities required by 10 CFR 30 have been completed, the license has been

terminated, the facility site is available for unrestricted use for any public or private purpose, and the escrow account has been terminated by joint notice, in writing, from GTC and the U.S. Nuclear Regulatory Commission (hereinafter, "NRC"); or (2) the escrow agent, State Street, has been notified by the NRC, in writing, that the licensee, GTC, has defaulted on the agreed obligation to carry out the decommissioning for the above listed facility(ies).

Paragraph 4. Disbursement of Property in Escrow Account

State Street shall make payments from the escrow account upon the presentation of a certificate duly executed by the President of GTC attesting to the occurrence of the events, and in the form set forth in the attached Specimen Certificate, and upon presentation of a certification attesting to the following conditions:

(1) that decommissioning is proceeding pursuant to an NRC-approved plan,

(2) that the funds withdrawn will be expended for activities undertaken pursuant to that plan, and

(3) that the NRC has been given 30 days prior notice of GTC's intent to withdraw funds from the escrow account.

No withdrawal from the account can exceed 10 percent of the outstanding balance of the escrow account or $15,000, whichever is greater, unless NRC approval is attached.

Or upon State Street receiving written notification of licensee's default from the NRC, State Street shall make payments from the escrow account as the NRC shall direct, in writing, to provide for the payment of the costs of the required decommissioning activities covered by this agreement. The escrow agent shall reimburse the licensee or other persons as specified by the NRC from the escrow account for expenses for required activities in such amounts as the NRC shall direct in writing. In addition, the escrow agent shall refund to GTC such amounts as the NRC specifies, in writing. Upon refund, such funds shall no longer constitute part of the escrow account as described in paragraph 2, above.

Paragraph 5. Irrevocability

It is also agreed between the parties that this escrow became irrevocable upon delivery to State Street, the escrow agent, and will remain irrevocable and in full force and effect until the occurrence of one of the conditions described in Paragraph 3, above.

Paragraph 6. Powers of the Escrow Agent

(a) The only powers and duties of the escrow agent shall be to hold the escrow property and to invest and dispose of it in accordance with the terms of this agreement.

(b) GTC acknowledges and agrees that the escrow agent (i) shall be obligated only for the performance of such duties as are specifically set forth in this agreement; (ii) shall not be obligated to take any legal or other action hereunder which might in its judgment involve expense or liability unless it shall have been furnished with indemnity acceptable to it; (iii) may rely on and shall be protected in acting or refraining from acting upon any written notice, instruction, instrument, statement, request or document furnished to it hereunder and believed by it to be genuine and to have been signed or presented by the proper person, and shall have no responsibility for determining the accuracy thereof; and (iv) may consult counsel satisfactory to it, including house counsel, and the advice or opinion of such counsel shall be full and complete authorization and protection in respect of any action taken, suffered or omitted by it hereunder in good faith and in accordance with the advice or opinion of such counsel.

(c) Neither the escrow agent nor any of its directors, officers or employees shall be liable to anyone for any action taken or omitted to be taken by it or any of its directors, officers or employees hereunder except in the case of gross negligence, bad faith or willful misconduct. GTC agrees to indemnify State Street and hold it harmless without limitation from and against any loss, liability or expense of any nature incurred by State Street arising out of or in connection with this agreement or with the administration of its duties hereunder, including, but not limited to, legal fees and expenses and other costs and expenses of defending or preparing to defend against any claim of liability in the premises, unless such loss, liability or expense shall be caused by the escrow agent's gross negligence, bad faith or willful misconduct. In no event shall the escrow agent be liable for indirect, punitive, special or consequential damages.

(d) GTC agrees to assume any and all obligations imposed now or hereafter by any applicable tax law with respect to the payments under this agreement, and to indemnify and hold State Street harmless from and against any taxes, additions for late payment, interest, penalties and other expenses, that may be assessed against State Street on any such payment from the escrow account or other activities under this agreement. GTC undertakes to instruct State Street in writing with respect to State Street's responsibility for withholding and other taxes, assessments or other governmental charges, certifications and governmental reporting in connection with its acting as escrow agent under this agreement. GTC agrees to indemnify and hold State Street harmless from any liability on account of taxes, assessments or other governmental charges, including without limitation the withholding or deduction or the failure to withhold or deduct same, and any liability for failure to obtain proper certifications or to properly report to governmental authorities, to which State Street may be or become subject in connection with or which arises out of this agreement, including costs and expenses (including reasonable legal fees and expenses), interest and penalties. Notwithstanding the foregoing, no distributions will be made unless State Street is supplied with an original, signed Form W-9 or its equivalent prior to distribution.

(e) The escrow agent shall invest and reinvest the principal and income of the escrow account at the written direction of GTC and keep the escrow account invested as a single fund, without distinction between principal and income, in accordance with general investment policies and guidelines which GTC may communicate in writing to the escrow

agent from time to time, subject, however, to the provisions of the escrow account; the escrow agent shall discharge its duties with respect to the escrow account solely in the interest of NRC and with the care, skill, prudence, and diligence, under the circumstances then prevailing, that persons of prudence, acting in like capacity and familiar with such matters, would use in the conduct of an enterprise of like character and with like aims; except that:

(i) Securities or other obligations of the licensee, or any other owner or operator of the licensed facility(ies), or any of their affiliates as defined in the Investment Company Act of 1940, as amended (15 U.S.C. 80A-2(a)), shall not be acquired or held, unless they are securities or other obligations of the Federal government;

(ii) The escrow agent is authorized to invest the escrow account in time or demand deposits to the extent insured by an agency of the Federal government; and

(iii) The escrow agent is authorized to hold cash, awaiting investment or distribution uninvested, for a reasonable time and without liability for the payment of interest thereon.

(f) Without in any way limiting the powers and discretion conferred upon the escrow agent by other provisions of this agreement or by law, the escrow agent is expressly authorized and empowered:

(i) To register any securities held in the escrow account in its own name or its nominee and to hold any security in bearer form or in book entry, or to deposit or arrange for the deposit of any securities issued by the U.S. Government, or any agency or instrumentality thereof, with a Federal Reserve bank, but the books and records of the escrow agent shall at all times show that all such securities are part of the escrow account;

(ii) To deposit any cash in the escrow account in interest-bearing accounts or savings certificates to the extent insured by an agency of the Federal government;

(iii) To pay taxes, from the account, of any kind that may be assessed or levied against the escrow account and all brokerage commissions incurred by the escrow account.

Paragraph 7. Annual Valuation

After delivery has been made into this escrow account, the escrow agent shall annually, at least 30 days before the anniversary date of receipt of the property into the escrow account, furnish to the licensee and to the NRC a statement confirming the value of the escrow account. Any securities in the account shall be valued at market value as of no more than 60 days before the anniversary date of the establishment of the escrow account. The failure of the licensee to object in writing to the escrow agent within 90 days after the statement has been furnished to the licensee shall constitute a conclusively binding assent by the licensee,

barring the licensee from asserting any claim or liability against the escrow agent with respect to the matters disclosed in the statement.

Paragraph 8. Successor Escrow Agent

Upon 90 days prior notice to the NRC and the licensee, GTC, the escrow agent may resign; upon 90 days notice to the NRC and the escrow agent, the licensee, GTC, may replace the escrow agent upon 30 days prior notice to the NRC; provided that such resignation or replacement is not effective until the escrow agent has appointed a successor escrow agent and this successor accepts the appointment. The successor escrow agent shall have the same powers and duties as those conferred upon the escrow agent under this agreement. Upon the successor's acceptance of the appointment, the escrow agent shall assign, transfer, and pay over to the successor the funds and properties then constituting the escrow account. If for any reason the licensee cannot or does not act in the event of the resignation of the escrow agent, the escrow agent may apply to a court of competent jurisdiction for the appointment of a successor, or for instructions. The successor escrow agent shall specify the date on which it assumes administration of the escrow account in a writing sent to the licensee, the NRC, and the current escrow agent by certified mail 10 days before the change becomes effective. Any expenses incurred by the escrow agent as a result of any of the acts contemplated by this paragraph shall be paid as provided in Paragraph 10 of this agreement.

Paragraph 9. Instructions to the Escrow Agent

All orders, requests, and instructions from the licensee to the escrow agent shall be in writing, signed by such persons as are signatories to this agreement, or such other designees as the licensee or the NRC may designate in writing. All orders, requests, and instructions from the NRC shall be in writing, signed by the designees of the NRC. The escrow agent shall be fully protected in acting in accordance with such orders, requests, and instructions. The escrow agent shall have the right to assume, in the absence of written notice to the contrary, that no event constituting a change or a termination of the authority of any person to act on behalf of the licensee or the NRC under this agreement has occurred. The escrow agent shall have no duty to act in the absence of such orders, requests, and instructions from the licensee and/or the NRC, except as provided in this agreement.

Paragraph 10. Compensation and Expenses of the Escrow Agent

The fee of the escrow agent for its services in establishing the escrow account shall be $750, payable at the time of the execution of this agreement, to be borne by GTC, licensee.

Expenses of the escrow agent for the administration of the escrow account, the compensation of the escrow agent for services subsequent to the establishing of the escrow account to the extent not paid directly by the licensee, and all other proper charges and disbursements shall be paid from the escrow account.

GTC agrees to pay or reimburse State Street for any legal fees and expenses incurred in connection with the preparation of this agreement and to pay State Street's reasonable

compensation for its normal services hereunder in accordance with the attached fee schedule, which may be subject to change on an annual basis. The escrow agent shall be entitled to reimbursement on demand for all expenses incurred in connection with the administration of the escrow created hereby which are in excess of its compensation for normal services hereunder, including without limitation, payment of any legal fees and expenses incurred by the escrow agent in connection with the resolution of any claim by any party hereunder.

Paragraph 11. Amendment to this Agreement

This agreement may be amended by an instrument in writing executed by the licensee and the escrow agent provided that the licensee has given 30 days prior notice to the NRC.

This agreement may not be altered or modified without the consent of the parties hereto, which consent shall not constitute a waiver of any of the terms or conditions of this agreement, unless such waiver is specified in writing, and then only to the extent to specified. A waiver of any of the terms and conditions of this agreement on one occasion shall not constitute a waiver of the other terms and conditions of this agreement, or of such terms and conditions on any other occasion.

Paragraph 12. Termination

This agreement can be terminated by written notice of termination to the escrow agent signed by GTC, licensee, and the NRC, or by the NRC alone, if the licensee has ceased to exist.

Paragraph 13. Interpretation

This escrow agreement constitutes the entire agreement between GTC and State Street. The escrow agent shall not be bound by any other agreement or contract entered into by GTC and the only document that may be referenced in case of ambiguity in this escrow agreement is the licensing agreement between GTC and the NRC, or its successor.

Paragraph 14. Acceptance of Appointment by Escrow Agent

State Street Bank and Trust Company, Corporate Trust Department, Two International Place, Boston, MA 02110, does hereby acknowledge its appoin[illegible] by Genzyme Transgenics Corp., the licensee, to serve as escrow agent for the escro[illegible]ount created under this agreement and agrees to carry out its obligations and duties [illegible]s stated in this escrow agreement.

Paragraph 15. Severability

If any part of this agreement is invalid, it shall not affect the remaining provisions that will remain valid and enforceable.

Paragraph 16. Dispute Resolution

It is understood and agreed that should any dispute arise with respect to the delivery, ownership, right of possession, and/or disposition of the escrow account, or should any claim be made upon such account by a third party, State Street, upon receipt of a written notice of such dispute or claim by the parties hereto or a third party, is authorized and directed to retain in its possession without liability to anyone, all or any of said account until such dispute shall have been settled either by the mutual agreement of the parties involved or by a final order, decree or judgment of a court in the United States of America, the time for perfection of an appeal of such order, decree or judgment having expired. State Street may, but shall be under no duty whatsoever to, institute or defend any legal proceeding which relate to the escrow account.

Paragraph 17. Consent to Jurisdiction and Service

GTC hereby absolutely and irrevocably consents and submits to the jurisdiction of the courts of the Commonwealth of Massachusetts and of any federal court located in said Commonwealth in connection with any actions or proceedings brought against GTC by State Street arising out of or relating to this agreement. In any such action or proceeding, GTC hereby absolutely and irrevocably waives personal service of any summons, complaint, declaration or other process and hereby absolutely and irrevocably agrees that service thereof may be made by certified or registered first class mail directed to GTC, at its address set forth in Paragraph 19 hereof.

Paragraph 18. Force Majeure

Neither GTC nor State Street shall be responsible for delays or failures in performance resulting from acts beyond its control. Such acts shall include but not be limited to acts of God, strikes, lockouts, riots, acts of war, epidemics, governmental regulations superimposed after the fact, fire, communication line failures, computer viruses, power failures, earthquakes or other disasters.

Paragraph 19. Notices

Any notice permitted or required hereunder shall be deemed to have been duly given if delivered personally or if mailed certified or registered mail, postage prepaid, to the parties at their addresses set forth below or to such other address as they may hereafter designate.

If to GTC:

Genzyme Transgenics Corp.
25 Birch Street
Milford, MA 01757
Attn: John B. Green
Chief Financial Officer

If to Escrow Agent:

State Street Bank and Trust Company
Two International Place
Boston, MA 02110
Attn: Debra J. Gauthier
Corporate Trust Department

Paragraph 20. Binding Effect

This Escrow Agreement shall be binding upon the respective parties hereto and their heirs, executors, successors and assigns.

Paragraph 21. Governing Law

This Escrow Agreement shall be governed by and construed under the laws of the Commonwealth of Massachusetts.

State Street Bank and Trust Company

By _____

Name MARK NELSON

Title VICE PRESIDENT

Date: 1/8/96

Kecia R. Banks
Notary

Kecia R. Banks, NOTARY PUBLIC
My commission expires: January 18, 2002

Genzyme Transgenics Corp.

By _____

Name James Geraghty

Title President

Date: 12/4/96

Notary

Commission Expires: 9/7/2001

Specimen Certificate attached to Escrow Agreement
Between Genzyme Transgenics Corp. and
State Street Bank and Trust Company
to Provide Financial Assurance to
Nuclear Regulatory Commission

State Street Bank and Trust Company
Corporate Trust Department
Two International Place
Boston, MA 02110

Attention: Escrow Division

Gentlemen:

In accordance with the terms of the Agreement with you dated _____ ____, I, _____, President of Genzyme Transgenics Corp. (hereinafter, "GTC"), hereby certify that the following events have occurred:

1. GTC is required to commence the decommissioning of its facilities located at [insert location of facility] (hereinafter called the decommissioning).

2. The plans and procedures for the commencement and conduct of the decommissioning have been approved by the United States Nuclear Regulatory Commission, or its successor, on _____ (copy of approval attached).

3. The Board of Directors of GTC has adopted the attached resolution authorizing the commencing of the decommissioning.

_____
President
Genzyme Transgenics Corp.

_____
Date

BIODEVELOPMENT Laboratories, Inc.

Helping Clients turn Discoveries into Products

A former division of
Arthur D Little

30 October 1995

Mr. David Everhart
US Nuclear Regulatory Commission
Region I Material Licensing Section
631 Park Avenue
King of Prussia, PA 19406

030-04605

Subject: Amendment to By-Product Materials License No. 20-01489-01(extended) and Cancellation of License No. 20-11085-01

Dear Mr. Everhart:

We appreciate the assistance that you and Pamela Henderson have given us regarding the amendment that we are submitting for By-Product Materials License No. 20-01489-01(extended). In addition to the letters included with this mailing, the NRC has received letters describing the transfer of ownership for both BIODEVELOPMENT Laboratories and TSI Mason Laboratories. These letters were submitted to Mr. Frank Costello on July 17, 1995 and October 11, 1995, respectively.

We recognize that we will need to submit updated information regarding the financial assurance for decontamination and expect to be sending this to you shortly.

We would be pleased to provide any additional information that you may need. Please do not hesitate to contact me if you have any questions. I can be reached at 617-441-1043.

Sincerely yours,

Denise Hayes
Director of Compliance

cc: J. Swiniarski
J. Basque
S. Niemi

OFFICIAL RECORD COPY **ML 10** 120639

NOV - ! 1995

30 Memorial Drive, Cambridge, MA 02142
Telephone: (617) 441-1000 Fax: (617) 441-1010

genzyme TSI transgenics

TSI Corporation
25 Birch Street
Milford, MA 01757
TEL 508.478.0877
FAX 508.478.1277

27 October 1995

Mr. David Everhart
US Nuclear Regulatory Commission
Region I Material Licensing Section
631 Park Avenue
King of Prussia, PA 19406

Subject: Amendment to By-Product Materials License No. 20-01489-01(extended)

Dear Mr. Everhart:

The purpose of this letter is to request an amendment to the subject license (20-01489-01), particularly with respect to Items 1 and 2, Licensee, and Item 10, Location of Use, and at the same time incorporate into the subject license another license (20-11085-01) for the reasons outlined below. We are requesting an expedited review of this amendment. Payment of the fee for this license amendment application will be submitted separately.

Recently, the stock of BIODEVELOPMENT Laboratories Inc. (BDL) was acquired by Genzyme Transgenics Corp. (GTC). BDL is now an operating unit of GTC. Another operating unit of GTC, TSI Mason Laboratories (Mason), is located at 57 Union St. Worcester, Massachusetts. Both BDL and Mason are contract toxicology laboratories. Currently, Mason's use of by-product material at 57 Union St is authorized by Materials License 20-11085-01.

Since both BDL and Mason are wholly owned subsidiaries divisions of GTC, we are requesting that all activities be consolidated under byproduct materials license no. 20-01489-01 with GTC named as the licensee. Byproduct materials license no. 20-11085-01 would be canceled when the responsibility is transferred to license 20-01489-01. The Radiation Safety Officers currently designated for license no. 20-01489-01 and no. 20-11085-01 will serve as the Radiation Safety Officer and Deputy Radiation Safety Officer, respectively.

To incorporate license no. 20-11085-01 into license no 20-01489, we request the following changes to items, 1, 2, 6, 7, 8, 9, 10, 11B:

Items 1 & 2

1. Genzyme Transgenics Corporation

2. 25 Birch Street
   Milford, Massachusetts 01757

genzyme TSI transgenics

TSI Corporation
25 Birch Street
Milford, MA 01757
TEL 508.478.0877
FAX 508.478.1277

Items 6, 7 & 8:

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 with Atomic Nos. 3 through 83 and with half-lives of 120 days or less	A. Any	A. Not to exceed 10 millicuries per isotope, 1 curie total
B. Any byproduct material with Nos. 1 through 83 with half-lives greater than 120 days	B. Any	B. See condition 12
C. Any byproduct material with Atomic Nos. 84 through 95	C. Any	C. See condition 12
D. Technetium 99m	D. Any	D. 100 millicuries
E. Iodine 125	E. Any	50 millicuries
F. Hydrogen 3	F. Foils(Varian Aerograph Model 02-000104-00)	Not to exceed 250 millicuries per foil and 5000 millicuries total

Item 9:

A. through E. Research and development as defined in 10 CFR 30.4; animals studies.
F. For use in Varian Aerograph Group I or II gas chromatograph device for sample analysis.

Item 10:

"Licensed material may be used only at the licensee's facilities on the 2d floor of 30 Memorial Drive, at 134 Main St, at 83 Rogers Street, all in Cambridge, Massachusetts, and at 57 Union St. Worcester, Massachusetts."

Item 11B:

B. The Radiation Safety Officer for this license is Joseph Swiniarski. Assistant Radiation Safety Officers for this license are Paul A. Zavorskas and Jeffrey Grant.

genzyme TSI transgenics

TSI Corporation
25 Birch Street
Milford, MA 01757
TEL 508.478.0877
FAX 508.478.1277

Mr. David Everhart
US Nuclear Regulatory Commission

Enclosed are copies of BDL's materials license and Mason's materials license.

We would be pleased to provide any additional information regarding our request for amendment that you may need. If you concur with these changes, we would appreciate your endorsemert of them.

Sincerely yours,

Joseph Swiniarski
Radiation Safety Officer
BIODEVELOPMENT Laboratories

Steven M. Niemi, DVM
Vice President, US Operations
Genzyme Transgenics Corporation

Enclosures

MATERIALS LICENSE

Amendment No. 53

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, 39, 40 and 70, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, possess, and transfer byproduct, source, and special nuclear material designated below; to use such material for the purpose(s) and at the place(s) designated below; to deliver or transfer such material to persons authorized to receive it in accordance with the regulations of the applicable Part(s). This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954, as amended, and is subject to all applicable rules, regulations and orders of the Nuclear Regulatory Commission now or hereafter in effect and to any conditions specified below.

Licensee	
1. BIODEVELOPMENT Laboratories, Inc. 2. 30 Memorial Drive Cambridge, Massachusetts 02142	In accordance with the letter dated May 16, 1994, 3. License number 20-01489-01 is amended in its entirety to read as follows: 4. Expiration date November 30, 1994 (extended) 5. Docket or Reference No 030-04605

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 with Atomic Nos. 3 through 83 and with half lives of 120 days or less	A. Any	A. Not to exceed 10 millicuries per isotope, 1 curie total
B. Any byproduct material with Atomic Nos. 1 through 83 and with half lives greater than 120 days	B. Any	B. See Condition 12
C. Any byproduct material with Atomic Nos. 84 through 95	C. Any	C. See Condition 12

9. Authorized use

A. through C. Research and development as defined in 10 CFR 30.4; animal studies.

CONDITIONS

10. Licensed material may be used only at the licensee's facilities located at 30 Memorial Drive (second floor), 134 Main Street and 83 Rogers Street, Cambridge, MA

11. A. Licensed material shall be used by, or under the supervision of, individuals designated in writing by the Radiation Safety Committee, Joseph Swiniarski, Chairperson.

    B. The Radiation Safety Officer for this license is Joseph Swiniarski.

12. In addition to the possession limits in Condition 8, the licensee shall further restrict the possession of NRC licensed material to 10' times the quantity specified in Appendix B to 10 CFR Part 30 and in accordance with the requirements of 10 CFR 30.35.

13. Licensed material shall not be used in or on human beings.

14. A. Sealed sources and detector cells containing licensed material shall be tested for leakage and/or contamination at intervals not to exceed six months or at such other intervals as are specified by the certificate of registration referred to in 10 CFR 32.210, not to exceed three years.

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 three months.

C. In the absence of a certificate from a transferor indicating that a leak test has been made within six 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 and detector cells 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 transfer 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 test shall be capable of detecting the presence of 0.005 microcurie of radioactive material on the test sample. 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 or detector cell shall be removed immediately from service and decontaminated, repaired, or disposed of in accordance with Commission regulations. The report shall be filed within five days of the date the leak test result is known with the U.S. Nuclear Regulatory Commission, Region I, ATTN: Chief, Nuclear Materials Safety Branch, 475 Allendale Road, King of Prussia, Pennsylvania 19406. The report shall specify the source or detector cell involved, the test results, and corrective action taken.

G. The licensee is authorized to collect leak test samples for analysis by the licensee. Alternatively, tests for leakage and/or contamination may be

MATERIALS LICENSE
SUPPLEMENTARY SHEET

License Number
20-01489-01

Docket or Reference Number
030-04605

Amendment No. 53

performed by persons specifically licensed by the Commission or an Agreement State to perform such services.

15. The licensee shall conduct a physical inventory every six months to account for all sealed sources and devices containing licensed material received and possessed under the license.

16. The licensee shall not use licensed material in field applications where activity is released except as provided otherwise by specific condition of this license.

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

18. The licensee is authorized to hold radioactive material with a physical half-life of less than 65 days for decay-in-storage before disposal in ordinary trash, provided:

    A. Waste to be disposed of in this manner shall be held for decay a minimum of ten half-lives.

    B. Before disposal as ordinary trash, the waste shall be surveyed at the container surface with the appropriate survey instrument 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. A record of each such disposal permitted under this License Condition shall be retained for three 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.

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

20. Pursuant to Sections 20.106(b) and 20.302 of 10 CFR Part 20, the licensee is authorized to dispose of licensed material by incineration provided the gaseous effluent from incineration does not exceed the limits specified for air in Appendix B, Table II of 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 of 10 CFR Part 20.

MATERIALS LICENSE
SUPPLEMENTARY SHEET

License Number: 20-01489-01
Docket or Reference Number: 030-04605
Amendment No. 53

21. 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 Nuclear Regulatory Commission's regulations shall govern unless the statements, representations, and procedures in the licensee's application and correspondence are more restrictive than the regulations.

A. Application dated January 27, 1988
B. Letter received March 17, 1989
C. Letter dated March 22, 1989
D. Letter dated June 16, 1989
E. Letter dated August 1, 1989
F. Letter dated September 1, 1989
G. Letter dated October 18, 1989
H. Letter dated November 8, 1993
I. Letter dated November 9, 1993
J. Letter dated November 20, 1993
K. Letter dated November 23, 1993
L. Letter dated November 24, 1993
M. Letter dated December 2, 1993
N. Letters dated May 16, 1994
O. Letter dated June 17, 1994
N. Letter dated September 26, 1994
O. Letters dated November 29, 1994

For the U.S. Nuclear Regulatory Commission

Date JAN 30 1995

By M. S Kunitzky
Nuclear Materials Safety Branch
Region I
King of Prussia, Pennsylvania 19406

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
475 ALLENDALE ROAD
KING OF PRUSSIA, PENNSYLVANIA 19406-1415

OCT 27 1994

Mr. J. Guarnieri
Biodevelopment Laboratories, Inc.
30 Memorial Drive
Cambridge, Massachusetts 02142

SUBJECT: LICENSE RENEWAL APPLICATION

Dear Mr Guarnieri:

This is to acknowledge receipt of your application for renewal of material(s) license identified above. Your application is deemed timely filed, and accordingly, the license will not expire until final action has been taken by this office.

Any correspondence regarding the renewal application should reference the control number specified above.

Sincerely,

Sheryl Villar

Sheryl Villar, Chief
Licensing Assistance Section
Division of Radiation Safety
and Safeguards

Docket No. 030-04605
License No. 20-01489-01
Control No. 120639

MATERIALS LICENSE

Amendment No. 14

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, 39, 40 and 70, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, possess, and transfer byproduct, source, and special nuclear material designated below; to use such material for the purpose(s) and at the place(s) designated below; to deliver or transfer such material to persons authorized to receive it in accordance with the regulations of the applicable Part(s). This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954, as amended, and is subject to all applicable rules, regulations and orders of the Nuclear Regulatory Commission now or hereafter in effect and to any conditions specified below.

Licensee	
1. BioDevelopment Laboratories, Inc. 2. 30 Memorial Drive Cambridge, Massachusetts 02140	In accordance with the letter dated November 9, 1993, 3. License number 20-01489-05 is amended in its entirety to read as follows: 4. Expiration date February 28, 1998 5. Docket or Reference No 030-06945

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. Cesium 137	A. Sealed source (ORNL J.L. Shepherd Model 6810)	A. 4,000 curies per source and 8,000 curies total

9. Authorized use

A. For use in a J.L. Shepherd Mark I, Model 68, Irradiator for the irradiation of small animals, and materials, except explosives and flammable materials, for education and research.

CONDITIONS

10. Licensed material may be used only at the licensee's facilities, Room 219D at 30 Memorial Drive, Cambridge, Massachusetts.

11. A. Licensed material shall be used by, or under the supervision and in the physical presence of, Joseph K. Swiniarski, or individuals who have been trained as specified in the application dated January 6, 1992. Records of training shall be maintained by the licensee.

B. The Radiation Safety Officer for this license is Joseph K. Swiniarski.

12. Sealed sources or detector cells containing licensed material shall not be opened or sources removed from source holders or detector cells by the licensee.

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 are specified by the certificate of registration referred to in 10 CFR 32.210, not to exceed 3 years.

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.

(13. Continued) CONDITIONS

C. In the absence of a certificate from a transferor indicating that a test has been made within six 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 and detector cells need not be leak tested if:

(i) they contain only hydrogen 3; or

(ii) they contain only a 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 transfer 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 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 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 I, ATTN: Chief, Nuclear Materials Safety Branch, 475 Allendale Road, King of Prussia, Pennsylvania 19406. The report shall specify the source involved, the test results, and corrective action taken.

G. The licensee is authorized to collect leak test samples for analysis by licensee. Alternatively, tests for leakage and/or contamination may be performed by persons specifically licensed by the Commission or an Agreement State to perform such services.

14. 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.

MATERIALS LICENSE
SUPPLEMENTARY SHEET

License number: 20-01489-05

Docket or Reference number: 030-06945

Amendment No. 14

(Continued) CONDITIONS

15. For each J. L. Shepherd and Associates, Mark I Cesium-137 Irradiator installed and used, the licensee shall:

A. permit the use of the irradiator only when a calibrated and operable radiation survey meter or room monitor is available; and

B. permit the irradiator door to be opened only after the operator has checked visual indicators to verify that the source has returned to its safe storage position; and

C. have room monitors installed that will:

(i) operate at all times when the irradiator is in use; and

(ii) activate a visible and audible alarm when radiation exceeds 2 millirems per hour; and

(iii) detect any radiation leaking from the irradiator door; and

(iv) be visible to the irradiator user when he is next to the irradiator; or

D. if a room monitor is not installed, have available a calibrated and operable survey meter which will be used to:

(i) determine the radiation level at the irradiation door when the door is closed; and

(ii) check for any increase in radiation levels each time the irradiator door is opened.

E. immediately stop the use of the irradiator and notify the Commission by telephone as described in 10 CFR 20.403(d) if abnormal levels of radiation or any malfunction of the irradiator is detected;

F. not repair or authorize repairs of the irradiator except by the manufacturer or other persons specifically authorized by the Commission or an Agreement State to perform such services.

MATERIALS LICENSE
SUPPLEMENTARY SHEET

License number: 20-01489-05

Docket or Reference number: 030-06945

Amendment No. 14

(Continued)

CONDITIONS

16. 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 Nuclear Regulatory Commission's regulations shall govern unless the statements, representations and procedures in the licensee's application and correspondence are more restrictive than the regulations.

A. Application dated January 6, 1992
B. Letter dated October 29, 1992
C. Letter dated January 5, 1993
D. Letter dated November 8, 1993
E. Letter dated November 9, 1993
F. Letter dated December 1, 1993

For the U.S. Nuclear Regulatory Commission

Date DEC 10 1993

By _____
Nuclear Materials Safety Branch
Region I
King of Prussia, Pennsylvania 19406

OCT 27 1994

Mr. J. Guarnieri
Biodevelopment Laboratories, Inc.
30 Memorial Drive
Cambridge, Massachusetts 02142

SUBJECT: LICENSE RENEWAL APPLICATION

Dear Mr Guarnieri:

This is to acknowledge receipt of your application for renewal of material(s) license identified above. Your application is deemed timely filed, and accordingly, the license will not expire until final action has been taken by this office.

Any correspondence regarding the renewal application should reference the control number specified above.

Sincerely,

Original Signed By:

Sheryl Villar, Chief
Licensing Assistance Section
Division of Radiation Safety
and Safeguards

Docket No. 030-04605
License No. 20-01489-01
Control No. 120639

DOCUMENT NAME: S:\PENDING\BIODEVEL.DTL
To receive a copy of this document, indicate in the box: "C" = Copy without attachment/enclosure "E" = Copy with attachment/enclosure "N" = No copy

OFFICE	RI/DRSS		RI/DRSS	N	/					
NAME	Brown/GMP		Villar							
DATE	10/27/94		10/27/94		10/ /94		10/ /94		10/ /94	

OFFICIAL RECORD COPY

ML 10

BIODEVELOPMENT Laboratories, Inc.

Helping Clients turn Discoveries into Products

A former division of
Arthur D Little

21 October 1994

030-04605

US Nuclear Regulatory Commission
Region I Material Section B
475 Allendale Road
King of Prussia, Pa 19406

Subject: Renewal of By-Product Materials License No. 20-01489-01

Dear Sir:

The purpose of this letter is to request a renewal of the subject license. A check for $2200.00 is enclosed to cover the category 3L fee.

BIODEVELOPMENT Laboratories, Inc. wishes to renew License No 20-01489-01 as presently constituted in the approved amendment No. 52, dated 9 November 1993 (Docket No. 030-04605), and in accordance with a pending application for amendment (Mail Control No. 119751), addressed to Mr. David Everhart dated 16 May 1994 and 26 September 1994, (see attachments). The pending amendment deals particularly with respect to license Items 6, 7, and 8, which describe licensed material and maximum possession limits, and with respect to Item 10, location of use. Other license particulars, i.e. Items 1 - 5, 9, 10 - 20 remain unchanged. The following is a summary of the pertinent license sections that have changed since 9 November 1993:

Items 6, 7, 8: Possession Limits

The amounts of by-product material that BIODEVELOPMENT Laboratories is licensed to possess exceeds the Company's current requirements. It is the Company's policy not to stock more byproduct material than current activities require. For this reason, BIODEVELOPMENT Laboratories requested that its possession limits be reduced (see attachment dated 16 May 1994).

The parts of License No. 20-01489-01 describing licensed radioactive materials should be amended to read as follows:

Log Nov 2 E (95)
Remitter
Check No. 003618
Amount $2200
Fee Category 3L
Type of Fee REN
Date Check Rec'd
Date Completed 11/3/94
By Brenda Brown

120639

OFFICIAL RECORD COPY ML 10

OCT 24 1994

30 Memorial Drive, Cambridge, MA 02142
Telephone: (617) 441-1000 Fax: (617) 441-1010

US Nuclear Regulatory Commission
Region I Material Section B

Byproduct, source, and/or special nuclear material	Chemical and/or physical form	Maximum amount that licensee may possess at any one time
A. Any byproduct material with Atomic Numbers 1 through 83 except as specified below	A. Any	A. Not to exceed 10 millicuries per radionuclide and 1 curie total except as listed below.
B. Any byproduct material with Atomic Numbers 84 through 95	B. Any	B. Not to exceed 1 millicurie per radionuclide and 20 millicuries total.
C. Hydrogen-3	C. Any	C. 1 Curie
D. Carbon-14	D. Any	D. 800 Millicuries

Item 10: Location of Use

Item 10 should read as follows:

10. Licensed material may be used only at the licensee's facilities at 30 Memorial Drive, 134 Main Street and 83 Rogers Street, Cambridge, Massachusetts.

BIODEVELOPMENT Laboratories, Inc., formerly a part of Arthur D. Little, Inc., is currently licensed, as of 9 November 1993, to use radioactive material at the Acorn Park, 30 Memorial Drive and 134 Main St., Cambridge, Massachusetts. All activities at Acorn Park involving byproduct material have been terminated and facilities there have been decommissioned by Arthur D. Little, Inc and BIODEVELOPMENT Laboratories, Inc. subsequent to the transfer of License No. 20-1489-01 to BIODEVELOPMENT Labs. Basement areas at the 30 Memorial Drive facility were decommissioned at the same time. Reports of decommissioning activities have been were submitted to NRC.

US Nuclear Regulatory Commission
Region I Material Section B

BIODEVELOPMENT Laboratories' research operations involving by-product materials are presently restricted to 30 Memorial Drive, 2d floor, and to 134 Main St. Plans of these areas are included in the attachment dated 16 May 1994.

BIODEVELOPMENT Laboratories, Inc. facilities at 83 Rogers St. are discussed in the attachment dated 26 September 1994. The Company wishes to add 83 Rogers Street to its license.

For the reasons described above, BIODEVELOPMENT Laboratories requests that the parts of License No. 20-01489-01 describing location of use be amended to include the licensee's facilities at 83 Rogers Street along with 30 Memorial Drive, 2d floor and 134 Main St, Cambridge, Massachusetts.

We would be pleased to provide any additional information regarding our request for renewal that you may need. The person to be contacted about this application is Joseph Swiniarski at (617)-441-1000 or (617)-441-1023.

Sincerely yours

Joseph Swiniarski

Joseph Swiniarski
Senior Scientist/RSO

Enclosures

MATERIALS LICENSE

Amendment No. 52

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, 39, 40 and 70, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, possess, and transfer byproduct source, and special nuclear material designated below; to use such material for the purpose(s) and at the place(s) designated below; to deliver or transfer such material to persons authorized to receive it in accordance with the regulations of the applicable Part(s). This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954, as amended, and is subject to all applicable rules, regulations and orders of the Nuclear Regulatory Commission now or hereafter in effect and to any conditions specified below.

Licensee	
1. BioDevelopment Laboratories, Inc. 2. 30 Memorial Drive Cambridge, Massachusetts 02140	In accordance with the letter dated November 9, 1993, 3. License number 20-01489-01 is amended in its entirety to read as follows: 4. Expiration date November 30, 1994 5. Docket or Reference No 030-04605

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 with Atomic Nos. 1 through 83	A. Any	A. Not to exceed 20 millicuries per radionuclide and 5 curies total
B. Any byproduct material with Atomic Nos. 84 through 95	B. Any	B. Not to exceed 1 millicurie per radionuclide and 20 millicuries total
C. Hydrogen 3	C. Any	C. 10 curies
D. Carbon 14	D. Any	D. 6 curies
E. Krypton 85	E. Any	E. 2 curies
F. Nickel 63	F. Any	F. 500 millicuries
G. Americium 241	G. Any	G. 20 millicuries

9. Authorized use

A. through G. Research and development as defined in 10 CFR 30.4; animal studies.

CONDITIONS

10. Licensed material may be used only at the licensee's facilities at Acorn Park, 30 Memorial Drive and 134 Main Street, Cambridge, Massachusetts.

11. A. Licensed material shall be used by, or under the supervision of, individuals designated by the licensee's Radiation Safety Committee, Joseph Swiniarski, Chairman.

B. The Radiation Safety Officer for this license is Joseph Swiniarski.

12. 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.

MATERIALS LICENSE
SUPPLEMENTARY SHEET

License number: 20-01489-01
Docket or Reference number: 030-04605
Amendment No. 52

(continued) CONDITIONS

13. Experimental animals administered licensed materials or their products shall not be used for human consumption.

14. The procedures contained in Technical Operations instruction manual for the Model 616 Gamma Ray Projector shall be followed and a copy of the manual shall be made available to each person using or having responsibility for the use of licensed material listed in Subitem 6.H.

15. A(1) Each sealed source or detector cell acquired from another person and containing licensed material, other than hydrogen 3, with a half-life greater than 30 days and in any form other than gas shall be tested for contamination and/or leakage before use. In the absence of a certificate from a transferor indicating that a test has been made within 6 months before the transfer, a sealed source or detector cell received from another person shall not be put into use until tested.

(2) Notwithstanding the periodic leak test required by this condition, any licensed sealed source or detector cell is exempt from such leak tests when the source or detector cell contains 100 microcuries or less of beta and/or gamma emitting materials or 10 microcuries or less of alpha emitting material.

(3) Except for alpha sources, the periodic leak test required by this condition does not apply to sealed sources that are stored and not being used. The sources excepted from this test shall be tested for leakage before any use or transfer to another person unless they have been leak tested within 6 months before the date of use or transfer.

B. Each sealed source or detector cell fabricated by the licensee shall be inspected and tested for construction defects, leakage, and contamination prior to use or transfer as a sealed source or detector cell. If the inspection or test reveals any construction defects or 0.005 microcurie or greater of contamination, the source shall not be used or transferred as a sealed source or detector cell until it has been repaired, decontaminated and retested.

C. Each sealed source containing licensed material, other than hydrogen 3, with a half-life greater than 30 days and in any form other than gas shall be tested for leakage and/or contamination at intervals not to exceed 6 months except that each source designed for the purpose of emitting alpha particles shall be tested at intervals not to exceed 3 months.

D. The test shall be capable of detecting the presence of 0.005 microcurie of radioactive material on the test sample. The test sample shall be taken from the sealed source or detector cell or from the surfaces of the device in which the sealed source or detector cell is permanently or semipermanently mounted or stored on which one might expect contamination to accumulate. Records of leak test results shall be kept in units of microcuries and maintained for inspection by the Commission. Records may be disposed of following Commission inspection.

MATERIALS LICENSE
SUPPLEMENTARY SHEET

License number
20-01489-01

Docket or Reference number
030-04605

Amendment No. 52

(15. continued) CONDITIONS

E. If the test required by Subsection A. or C. of this condition reveals the presence of 0.005 microcurie or more of removable contamination, the licensee shall immediately withdraw the sealed source or detector cell from use and shall cause it to be decontaminated and repaired or to be disposed of in accordance with Commission regulations. A report shall be filed within 5 days of the date the leak test result is known with the U. S. Nuclear Regulatory Commission, Region I, ATTN: Chief, Nuclear Materials Safety Branch, 475 Allendale Road, King of Prussia, Pennsylvania 19406, describing the equipment involved, the test results, and the corrective action taken.

16. The licensee shall conduct a physical inventory every six months to account for all sealed sources and devices containing licensed material received and possessed under the license. Records of inventories shall be maintained for five years from the date of each inventory, and shall include the quantities and kinds of byproduct material, manufacturer name and model numbers, location of sources and/or devices, and the date of the inventory.

17. 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.

18. The licensee may transport licensed material in accordance with the provisions of 10 CFR Part 71, "Packaging and Transportation of Radioactive Material".

19. Pursuant to Sections 20.106(b) and 20.302 of 10 CFR Part 20, the licensee is authorized to dispose of licensed 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.

MATERIALS LICENSE
SUPPLEMENTARY SHEET

License number: 20-01489-01
Docket or Reference number: 030-04605
Amendment No. 52

(Continued) CONDITIONS

20. 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 Nuclear Regulatory Commission's regulations shall govern unless the statements, representations and procedures in the licensee's application and correspondence are more restrictive than the regulations.

A. Application dated January 27, 1988
B. Letter received March 17, 1989
C. Letter dated March 22, 1989
D. Letter dated June 16, 1989
E. Letter dated August 1, 1989
F. Letter dated September 1, 1989
G. Letter dated October 18 1989
H. Letter dated November 8, 1993
I. Letter dated November 9, 1993
J. Letter dated November 20, 1993
K. Letter dated November 23, 1993
L. Letter dated November 24, 1993
M. Letter dated December 2, 1993

For the U.S. Nuclear Regulatory Commission

Date DEC 10 1993

By Elizabeth K. Williams
Nuclear Materials Safety Branch
Region I
King of Prussia, Pennsylvania 19406

BIODEVELOPMENT Laboratories, Inc.

Helping Clients turn Discoveries into Products

A former division of
Arthur D Little

May 16, 1994

Mr. David Everhart
U.S. Nuclear Regulatory Commission
Region I Material Licensing Section
475 Allendale Road
King of Prussia, PA 19406

Re: By-Product Materials License No. 20-01489-01

Dear Mr. Everhart:

The purpose of this letter is to request an amendment to the subject license, particularly with respect to Items 6, 7 and 8, which describe licensed material and maximum possession limits, and with respect to Item 10, location and use.

A. **Quantities and Types of By-product Material**

The quantities and types of by-product material that BIODEVELOPMENT Laboratories, Inc. ("BIODEVELOPMENT") is currently licensed to possess exceed its present requirements and projected future needs. Over the past several years, the level of use of by-product material at BIODEVELOPMENT's facilities at 30 Memorial Drive, 134 Main Street and Acorn Park, Cambridge, Massachusetts has been well below the maximum licensed quantities. This level of use has been characteristic of Arthur D. Little, Inc.'s ("Arthur D. Little") operations prior to December 10, 1993 and BIODEVELOPMENT's operations since that time. You will recall that Arthur D. Little's material license was transferred to BIODEVELOPMENT as a result of a license amendment approved by your office on December 10, 1993.

As a result of Arthur D. Little's decommissioning at 30 Memorial Drive and Acorn Park, and the decommissioning reports and certification submitted on or about the date hereof, contamination resulting from historic by-product material use has been remediated in accordance with applicable NRC regulations. Areas decommissioned by Arthur D. Little, including the basement, first and third floors of 30 Memorial Drive and all facilities at Acorn Park, with the exception of Building 15W, Room 316, will no longer be available for by-product material use under this license.

BIODEVELOPMENT's use of by-product material and the potential for by-product material contamination at the 30 Memorial Drive, 134 Main Street and Acorn Park facilities under the subject license will be limited to BIODEVELOPMENT's use of the quantities and

30 Memorial Drive, Cambridge, MA 02142
Telephone: (617) 441-1000 Fax: (617) 441-1010

types of by-product material set forth below, which materials will be restricted to the locations set out in paragraph B.

For these reasons BIODEVELOPMENT requests that Items 6, 7 and 8 of License No. 20-01489-01 be amended to read as follows:

By-product, source and/or special nuclear material	**Chemical and/or physical form**	**Maximum amount that licensee may possess at any one time under this license**
A. Any by-product material with Atomic Numbers 1 through 83 except as specified below	A. Any	A. Not to exceed 10 millicuries per radionuclide and 1 curie total except as listed below.
B. Any by-product material with Atomic Numbers 84 through 95	B. Any	B. Not to exceed 1 millicurie per radionuclide and 20 millicuries total.
C. Hydrogen-3	C. Any	C. 1 Curie
D. Carbon-14	D. Any	D. 800 Millicuries

B. **Location and Use**

BIODEVELOPMENT is currently licensed to use by-product material throughout all of the facilities at 30 Memorial Drive, 134 Main Street, Acorn Park, Cambridge, Massachusetts. BIODEVELOPMENT, in its future conduct of business under this license, will only use by-product materials on the 2nd floor of 30 Memorial Drive, 134 Main Street, and Building 15W Room 316 at Acorn Park. Floor plans of these areas are included with this letter. BIODEVELOPMENT will not undertake the use of by-product materials in any locations other than the areas identified above, as illustrated on the attached Plans.

The remaining areas of 30 Memorial Drive and Acorn Park, Cambridge, Massachusetts, some of which were formerly used for operations involving by-product materials, have been decommissioned in accordance with applicable NRC regulations. As set forth in the Arthur D. Little report and certification submitted on or about the date hereof, historical contamination in areas formerly licensed for use of by-product material has now been remediated. These areas include the basement, first and third floors of 30 Memorial Drive and all of Acorn Park, with the exception of Building 15W, Room 316.

For these reasons, BIODEVELOPMENT requests that Item No. 10 of the License No. 20-01489 01 describing location of use be amended to read as follows:

Licensed material may be used only at the licensee's facilities on the 2nd floor of 30 Memorial Drive; 134 Main Street and Building 15W Room 316, Acorn Park, Cambridge, Massachusetts.

C. **Financial Assurance**

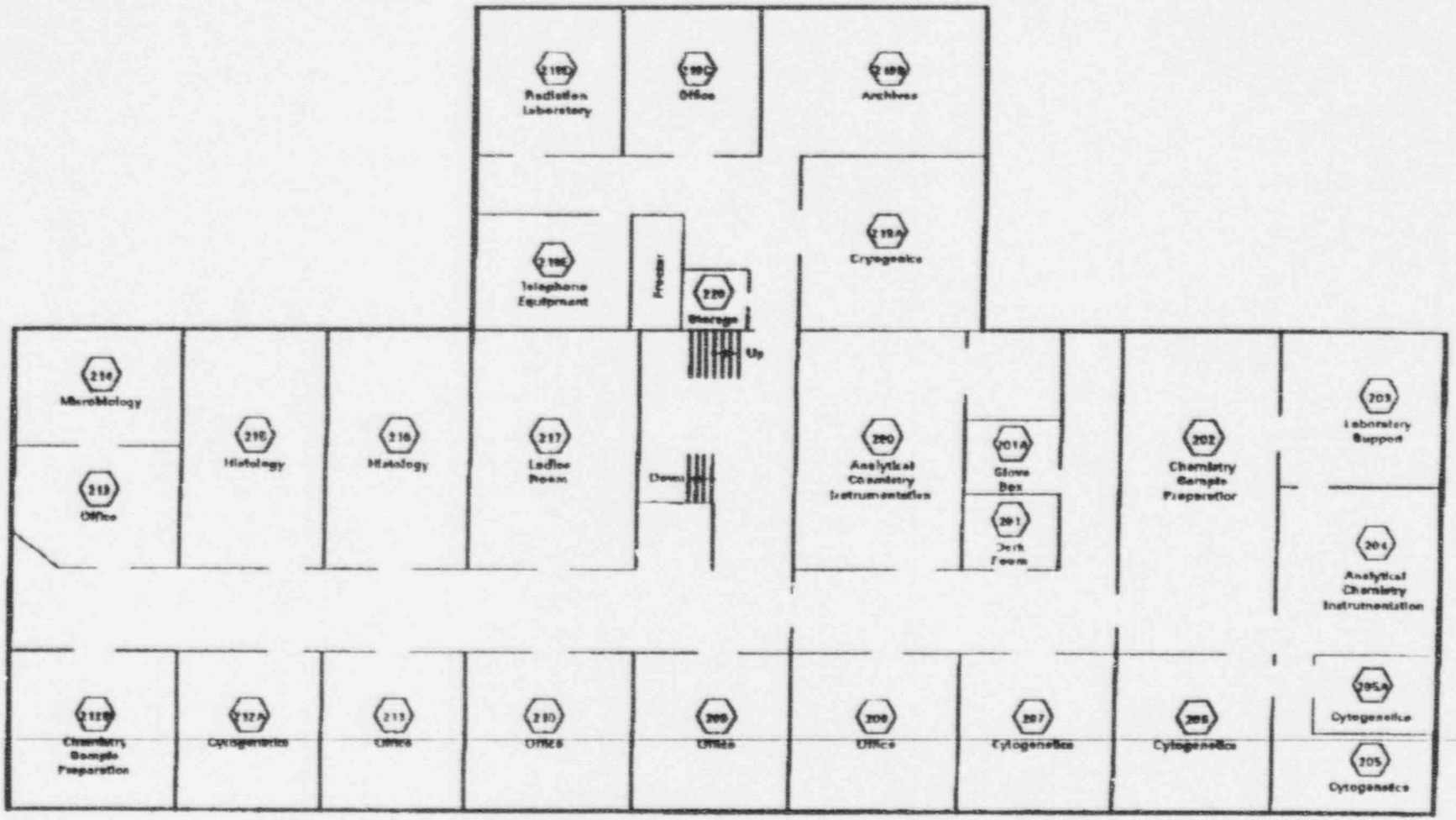
As a result of this amendment to reduce the quantities and types of by-product material and limit the areas in which by-product materials will be used, and Arthur D. Little's decommissioning report and certification submitted herewith, BIODEVELOPMENT requests a reduction in its financial assurance amount in accordance with 10 CFR §30.35. Currently a financial assurance amount of $750,000 is being maintained in the form of two letters of credit: one in the amount of $600,000 and one in the amount of $150,000. Disbursements from this financial assurance fund are governed by a Standby Trust Agreement with the Morgan Guaranty Trust Company. BIODEVELOPMENT proposes to reduce the existing financial assurance fund by $600,000. The remaining $150,000 of the assurance fund is sufficient to cover the actual and projected quantity and type of by-product material use at BIODEVELOPMENT's facilities. The financial assurance fund will continue to be pledged in the form of a letter of credit and Standby Trust Agreement, and BIODEVELOPMENT will provide a revised certification of financial assurance upon the review and approval of this amendment.

We would be pleased to provide any additional information regarding our request for amendment that you may need. If you concur with these changes, we would appreciate your endorsement of them.

Sincerely,

Joseph Swiniarski
Senior Scientist
Radiation Safety Officer

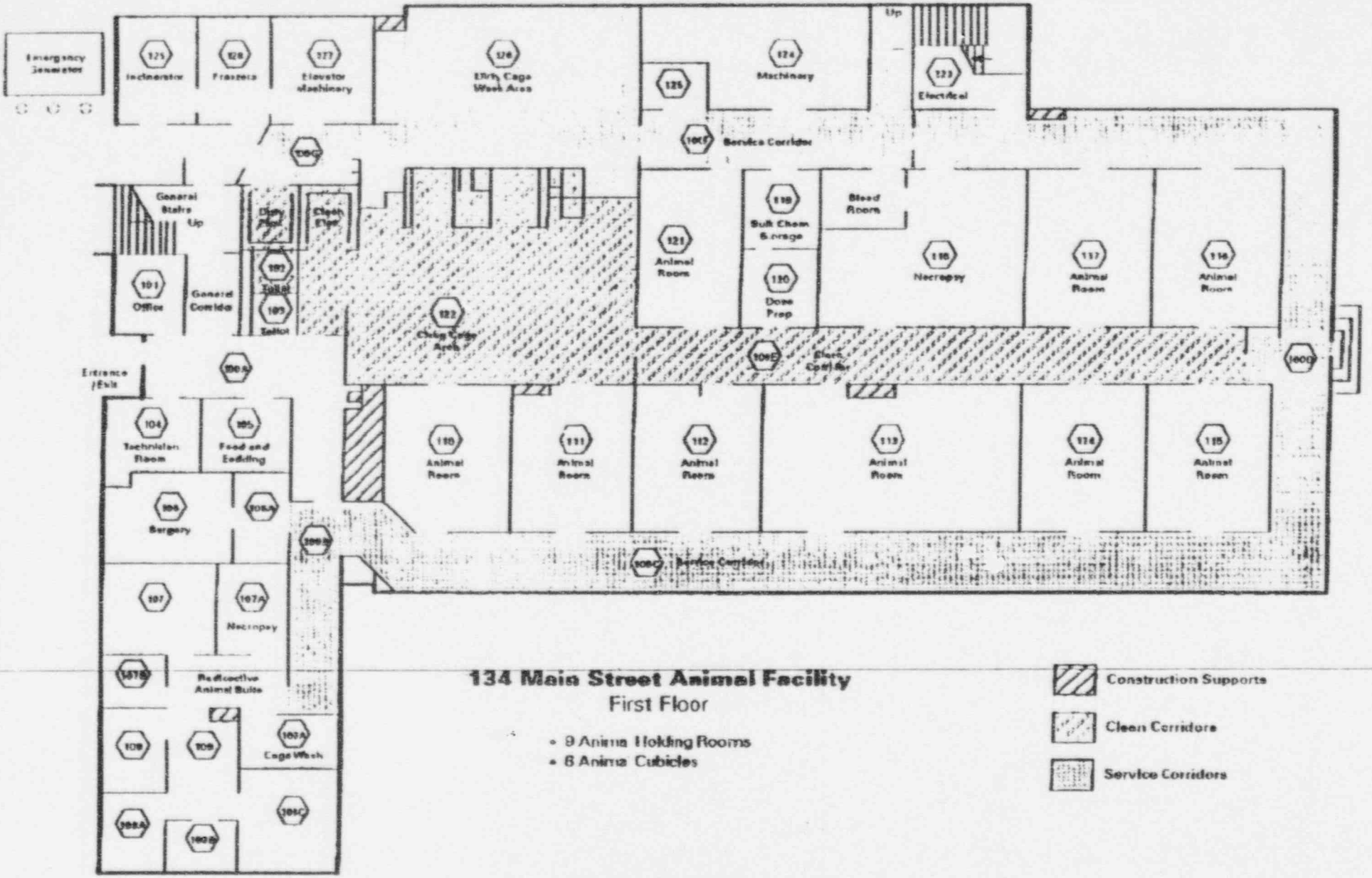
Enclosures
cc: J. Guarnieri, BIODEVELOPMENT Laboratories, Inc.
M. Kablack, Palmer & Dodge
B. Tauro Saunders, Arthur D. Little, Inc.



30 Memorial Drive Laboratories

Second Floor

BIODEVELOPMENT Laboratories, Inc.



134 Main Street Animal Facility

First Floor

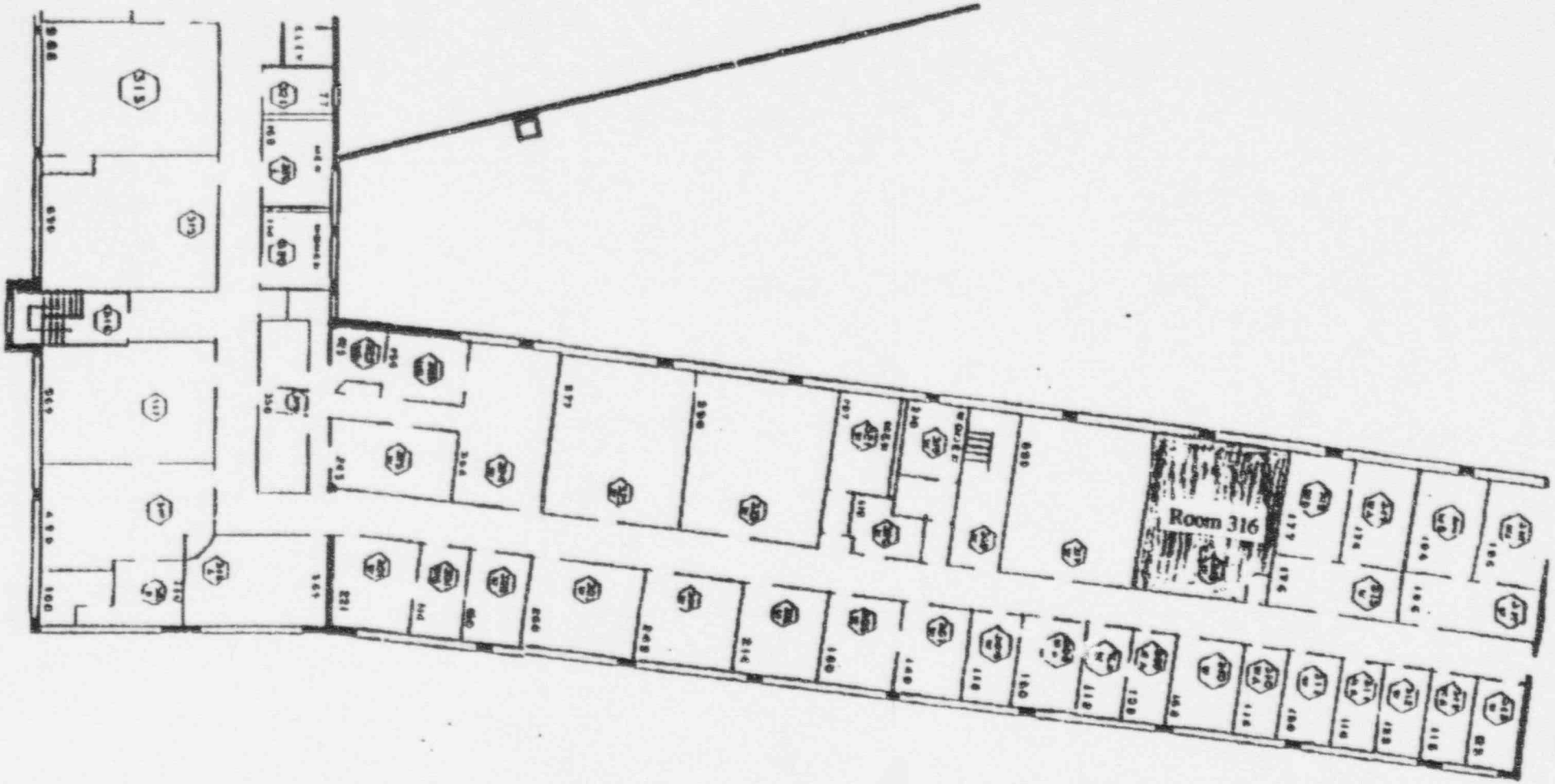
- 9 Anima Holding Rooms
- 6 Anima Cubicles

Construction Supports

Clean Corridors

Service Corridors

BIODEVELOPMENT Laboratories, Inc.



Building 15W - Acorn Park
Third Floor

BIODEVELOPMENT Laboratories, Inc.

BIODEVELOPMENT Laboratories, Inc.

Helping Clients turn Discoveries into Products

A former division of
Arthur D Little

26 September 1994

Mr. David Everhart
US Nuclear Regulatory Commission
Region I Material Licensing Section
631 Park Avenue
King of Prussia, PA 19406

Subject: By-Product Materials License No. 20-01489-01

Dear Mr. Everhart:

The purpose of this letter is to add an item to our request for an amendment to the subject license dated May 16, 1994, particularly with respect to Item 10, location of use.

Location of Use

BIODEVELOPMENT Laboratories Inc. is currently licensed to use radioactive material throughout all the facilities at Acorn Park, 30 Memorial Drive and 134 Main St., Cambridge, Massachusetts. In its May 16, 1994 amendment application, BIODEVELOPMENT Laboratories, Inc. proposed to limit activities utilizing by-product material to Building 15W Room 316 at Acorn Park , to the 2d floor of 30 Memorial Drive, and to 134 Main St. The remaining areas of 30 Memorial Drive and Acorn Park, Cambridge, Massachusetts having been decommissioned in accordance with NRC regulations.

Recently the corporate management of BIODEVELOPMENT Laboratories, Inc. decided to terminate all operations at its Acorn Park facility and move those operations to new quarters at 83 Rogers Street, Cambridge, Mass. The Rogers Street facility consists of approximately 10,500 sq. ft. of office and laboratory space. It is a single story brick and concrete building recently modernized by the previous tenant, Repligen Corp., to function as a biochemistry laboratory. A floor plan of the building is included with this letter. By-product material will be used primarily, but not exclusively, in the laboratory spaces marked on the plan "Mass Spectrophotometry", "Liquid Chromatography (LC)" and "Sample Prep 4." Any small quantities of radioactive waste resulting from analytical procedures that cannot be otherwise disposed of will be kept in the area designated "Waste storage" on the plan.

For these reasons, BIODEVELOPMENT Laboratories requests that the part of License No. 20-01489-01 describing location of use be amended to read as follows:

"Licensed material may be used only at the licensee's facilities on the 2d floor of 30 Memorial Drive, at 134 Main St and at 83 Rogers Street, Cambridge, Massachusetts."

The amount of by-product material used by BIODEVELOPMENT Laboratories at its facilities will be the same as proposed in the May 16, 1994 Amendment application.

30 Memorial Drive, Cambridge, MA 02142
Telephone: (617) 441-1000 Fax: (617) 441-1010

Mr. David Everhart
US Nuclear Regulatory Commission

In addition, BIODEVELOPMENT Laboratories, Inc. has entered into a contract with Applied Consultants Inc. of Woburn, Mass. to decommission Building 15W Room 316 at Acorn Park. Work is expected to start on October 3 and to be completed within 1 week. A decommissioning report and certification of remediation will be submitted shortly thereafter.

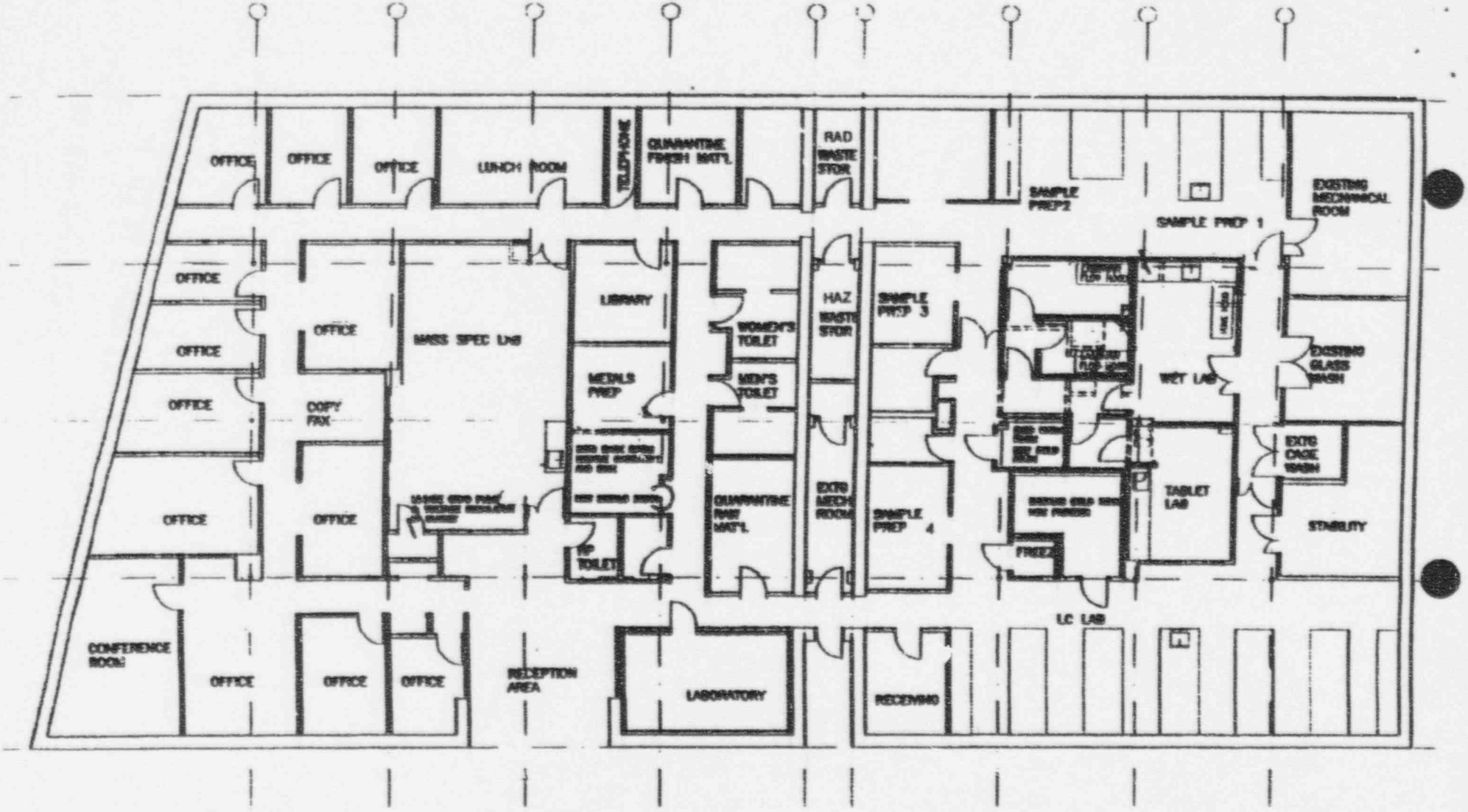
In all other respects our Amendment application dated May 16, 1994 remains unmodified.

We would be pleased to provide any additional information regarding our request for amendment that you may need. If you concur with these changes, we would appreciate your endorsement of them.

Sincerely yours,

Joseph Swiniarski
Senior Scientist
Radiation Safety Officer

Enclosures
cc: J. Guarneri, BIODEVELOPMENT Laboratories, Inc.
M. Kablack, Palmer & Dodge



BIODEVELOPMENT Laboratories, Inc.
83 Rogers Street
Cambridge, MA

BETWEEN:

LICENSE FEE MANAGEMENT BRANCH, ARM
AND
REGIONAL LICENSING SECTIONS

(FOR LFMS USE)
INFORMATION FROM LTS

PROGRAM CODE: 03610
STATUS CODE: 2
FEE CATEGORY: 3L
EXP. DATE: 19941130
FEE COMMENTS: ----------
DECOM FIN ASSUR REQD: Y

LICENSE FEE TRANSMITTAL

A. REGION

1. APPLICATION ATTACHED
APPLICANT/LICENSEE: BIODEVELOPMENT LABORATORIES, INC.
RECEIVED DATE: 941024
DOCKET NO: 3004605
CONTROL NO.: 120639
LICENSE NO.: 20-01489-01
ACTION TYPE: RENEWAL

2. FEE ATTACHED
AMOUNT: $2,200.00
CHECK NO.: 003618

3. COMMENTS

SIGNED Kim H. Lee
DATE 10/27/94

B. LICENSE FEE MANAGEMENT BRANCH (CHECK WHEN MILESTONE 03 IS ENTERED /✓/)

1. FEE CATEGORY AND AMOUNT: 3L $2200

2. CORRECT FEE PAID. APPLICATION MAY BE PROCESSED FOR:
AMENDMENT ----------
RENEWAL ✓
LICENSE ----------

3. OTHER ----------

SIGNED Russell Bell
DATE 11/3/94

1994 NOV -1 AM 7:53