MATERIALS LICENSE

Amendment No. 05

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.

398476

Licensee	
1. American Red Cross Badger Regional Blood Center 2. 4860 Sheboygan Avenue P. O. Box 5905 Madison, WI 53705	In accordance with application dated April 18, 1995 3. License Number 48-15423-02 is renewed in its entirety to read as follows: 4. Expiration Date February 28, 2000 5. Docket or Reference No. 030-18608

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 sources (J. L. Shepherd Model No. 6801 or ORNL Model No. A-0096)	A. 2200 curies

9. Authorized Use:

A. To be used in a J. L. Shepherd and Associates Model 143-45A Gamma Cell Irradiator for the irradiation of biological samples and blood products.

CONDITIONS

10. Licensed material shall be used only at the licensee's facilities located at 4860 Sheboygan Ave., Madison, Wisconsin.

11. Licensed material shall be used by, or under the supervision of, Paul M. DeLuca, Dr. Gary A. Becker, Dr. A. J. Hibbard or George Gaucys.

12. A. (1) The source(s) specified in Item 7.A. shall be tested for leakage and/or contamination at intervals not to exceed 6 months. Any source received from another person which is not accompanied by a certificate indicating that a test was performed within 6 months before the transfer shall not be put into use until tested.

100001

MATERIALS LICENSE
SUPPLEMENTARY SHEET

License Number
48-15423-02
Docket or Reference Number
030-18608
Amendment No. 05

12. (Continued)

(2) Notwithstanding the periodic leak test required by this condition, any licensed sealed source is exempt from such leak tests when the source contains 100 microcuries or less of beta and/or gamma emitting material or 10 microcuries or less of alpha emitting material.

B. Any source in storage and not being used need not be tested. When the source is removed from storage for use or transfer to another person, it shall be tested before use or transfer.

C. 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, the source shall be removed from service and decontaminated, repaired, or 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 III, 801 Warrenville Road, Lisle, Illinois 60532-4351, ATTN: Chief, Nuclear Materials Licensing Branch. The report shall specify the source involved, the test results, and corrective action taken. Records of leak test results shall be kept in units of microcuries and shall be maintained for inspection by the Commission. Records may be disposed of following Commission inspection.

D. Tests for leakage and/or contamination shall be performed by the licensee or by other persons specifically licensed by the Commission or an Agreement State to perform such services.

13. Sealed sources containing licensed material shall not be opened or removed from the irradiator by the licensee.

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.

15. The procedures contained in J. L. Shepherd instruction manual for the Model 143-45A device shall be followed and a copy of this manual shall be made available to each person using or having responsibility for the use of licensed material.

MATERIALS LICENSE
SUPPLEMENTARY SHEET

License Number
48-15423-02

Docket or Reference Number
030-18608

Amendment No. 05

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

A. Application dated April 18, 1995; and

B. Letter dated July 16, 1996.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Date Feb 3, 1997

By Evelyn B Weaver
Nuclear Materials Licensing Branch, Region III

COPY

BETWEEN:

LICENSE FEE MANAGEMENT BRANCH, ARM
AND
REGIONAL LICENSING SECTIONS

(FOR LFMS USE)
INFORMATION FROM LTS

PROGRAM CODE: 03510
STATUS CODE: 2
FEE CATEGORY: 3E 3M
EXP. DATE: 19950530
FEE COMMENTS:
DECOM FIN ASSUR REQDT N

LICENSE FEE TRANSMITTAL

A. REGION

1. APPLICATION ATTACHED
APPLICANT/LICENSEE: AMERICAN RED CROSS
RECEIVED DATE: 950425
DOCKET NO: 3018608
CONTROL NO.: 39847A
LICENSE NO.: 48-15423-02
ACTION TYPE: RENEWAL

2. FEE ATTACHED
AMOUNT: 2260
CHECK NO.: 1030598

3. COMMENTS

SIGNED Jane Bell
DATE 4-25-95

B. LICENSE FEE MANAGEMENT BRANCH (CHECK WHEN MILESTONE 03 IS ENTERED /✓/)

1. FEE CATEGORY AND AMOUNT: 3E 3M $2260.00

2. CORRECT FEE PAID. APPLICATION MAY BE PROCESSED FOR:
AMENDMENT
RENEWAL ✓
LICENSE

3. OTHER

SIGNED SC
DATE 5/1/95

1500
760
2260

RECEIVED
MAY - 3 1995
REGION III

1995 APR 28 AM 8:07

NRC FORM 313 (10-94)
10 CFR 30, 32, 33, 34, 35, 36, 39 and 40

U. S. NUCLEAR REGULATORY COMMISSION

APPLICATION FOR MATERIAL LICENSE

APPROVED BY OMB: NO. 3150-0120
EXPIRES 6-30-96

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.

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

- [ ] A. NEW LICENSE
- [ ] B. AMENDMENT TO LICENSE NUMBER _____
- [XX] C. RENEWAL OF LICENSE NUMBER 48-15423-02

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

American Red Cross
Badger-Hawkeye Regional Blood Center
4860 Sheboygan Avenue
Madison, WI 53705

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

4860 Sheboygan Avenue
Madison, WI 53705

4. NAME OF PERSON TO BE CONTACTED ABOUT THIS APPLICATION

James Rowe

TELEPHONE NUMBER

(608) 233-9300

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 3E/3M

AMOUNT ENCLOSED $ 2,260.00

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

THE APPLICANT AND ANY OFFICIAL EXECUTING THIS CERTIFICATION ON BEHALF OF THE APPLICANT, NAMED IN ITEM 2, CERTIFY THAT THIS APPLICATION IS PREPARED IN CONFORMITY WITH TITLE 10, CODE OF FEDERAL REGULATIONS, PARTS 30, 32, 33, 34, 35, 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
James R. Rowe, Radiation Safety Officer	J R. Rowe	04/18/95

FOR NRC USE ONLY

RECEIVED
APR 24 1995
REGION III

TYPE OF FEE	FEE LOG	FEE CATEGORY	AMOUNT RECEIVED	CHECK NUMBER	COMMENTS
Renewal	APR 20 III	3E 3M	$2260	30598	

APPROVED BY: SC

DATE: 5/1/95

NRC FORM 313 (10-94)

PRINTED ON RECYCLED PAPER

398476

American Red Cross

Blood Services, Badger-Hawkeye Region
Madison Location
4860 Sheboygan Avenue, P.O. Box 5905
Madison, Wisconsin 53705-0905
(608) 233-9300
FAX (608) 233-8318

April 21, 1995

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

RE: Renewal Application for License #48-15423-02

Good day ,

Enclosed please find two copies of renewal application for materials license #48-15423-02 along with a check in the amount of $2,260.00. I confirmed the application fee amount with Shirley Crutchfield at NRC Headquarters.

If there are any questions with this application or our program please contact me.

Sincerely,

James Rowe
Radiation Safety Officer

ITEM 5. Radioactive Material

a. Element & mass numbers	b. Form	c. Limit
A. Cesium-137	Sealed sources (J.L. Shepherd Model No. 6801 or ORNL Model A-0096)	2200 curies total
B. Hydrogen-3	Any	20 millicuries
C. Chromium-51	Any	20 millicuries
D. Phosphorus-32	Any	10 millicuries
E. Sulphur-35	Any	10 millicuries

ITEM 6. Purpose(s) for which licenced material will be used

A. To be used in a J.L. Shepherd and Associates Model 143-45A Gamma Cell Irradiator for the irradiation of biological samples and blood products.

B., C., D., and E. For <u>in vitro</u> laboratory research.

ITEM 7. Individuals responsible for Radiation Safety Program and their training and experience

Curricula vitae are enclosed for the following personnel:

James R. Rowe, Radiation Safety Officer

Gary A. Becker, M.D., Principal Officer

A.J. Hibbard, M.D., Medical Director

George Gaučys, Director, HLA Laboratory

Paul M DeLuca, Jr., Ph.D., Health Physics Consultant

Additional pertinent information for James Rowe, RSO:

Jul '83 - Feb '85 — Received basic radiation safety training as well as training in the use of H-3, P-32, Cr-51 & sealed source irradiators. Routinely used H-3 (200-800 μCi per use, 1-2 times a week) and a JL Shepherd model 109 Cs-137 sealed source irradiator (delivering approx. 4000 rads to samples in vitro research 1-3 times per week).

Mar '85 — Completed the course *Occupational & Environmental Radiation Protection* at the Harvard School of Public Health, Boston MA.

Apr '85 - Present — Served as Radiation Safety Officer for the American Red Cross, Badger Regional Blood Center, license # 48-15423-02. Supervised a total of 68 radiation workers in the receipt and use of the following materials:

Radionuclide	Received	Average Activity Used
2,200 Ci Cs-137 irradiator	1	over 5,000 irradiations
P-32	102.5 mCi	50 μCi/use
Cr-51	1.0 mCi	250 μCi/use
H-3	51.0 mCi	400 μCi/use

During this period the center received three NRC inspections, on September 4, 1985; on January 15, 1988 and on April 17, 1991. In all three inspections cases no observations or items of noncompliance were noted.

CURRICULUM VITAE

JAMES RUSSELL ROWE

Address:

work: 4860 Sheboygan Ave
Madison, WI 53705
(608) 233-9300

home:

Birth: Racine **Citizenship:** USA

Education: University of Wisconsin B.S. 1982
Madison, WI.

Professional Experience:

Quality Assurance Specialist — January 1995 to present
American Red Cross, Madison, WI

Radiation Safety Officer — April 1985 to present
American Red Cross, Madison, WI

Director, Customer Service — March 1993 to January 1995
American Red Cross, Madison, WI

Compliance Specialist — September 1991 to March 1993
American Red Cross, Madison, WI

Research Program Manager — February 1988 to September 1991
American Red Cross, Madison, WI

Research Specialist — February 1985 to February 1988
American Red Cross, Madison, WI

Research Specialist — July 1983 to February 1985
Department of Medicine
University of Wisconsin, Madison, WI

Membership in Professional Societies

American Society for Histocompatibility and Immunogenetics 1986-1990.

American Association of Blood Banks 1992-1995.

American Society for Quality Control 1995 to present.

Publications:

Faustini DL, Rowe JR, Burkholder WE. A male produced aggregation pheromone in Tribolium brevicornis (LeConte) (Coleoptera:Tenebrionidae) and interspecific responses of several Tribolium species. J. Stored Prod. Res., (1982) 18:53-158.

Sheehy MJ, Rowe JR, MacDonald MJ. A particular subset of HLA-DR4 accounts for all or most of the DR4 association in Type I Diabetes. Diabetes, (1985) 34 no.9:942-944.

Sheehy MJ, Rowe JR, Fuller TC, Yunis EJ, Gabbay KH. A minor subset of HLA-DR3 haplotypes is preferentially increased in Type I (insulin dependent) Diabetes. Diabetologia, (1985) 28:891-894.

Sheehy MJ, Rowe JR, Koning F, Jorgensen L. Functional polymorphism of the HLA-DR Beta-III chain. Human Immunology, (1988) 21:49-62.

Rowe JR, Mickelson EM, Hansen JA, MacDonald MJ, Gabbay KH, Yunis EJ, Sheehy MJ. DR beta-I alleles are useful markers for, but probably distinct from, the DR-4 associated diabetes gene. Human Immunology, (1988) 22:51-60.

Rowe JR, Koning F, Jorgensen L, Sheehy MJ. Three functionally distinct DRw52 subtypes are alleles of the DRβIII locus. Immunobiology of HLA Vol. No. 2: Immunogenetics and Histocompatibility, Bo Dupont, ed., Springer - Verlag NY, Berlin, Heidelberg, London, Paris, Tokyo, Hong Kong, (1989), pp. 261-262.

Sheehy MJ, Scharf SJ, Rowe JR, Gimenez MHN, Meske LM, Erlich HA, Nepom BS. A Diabetes-susceptible HLA haplotype is best defined by a combination of HLA-DR and DQ alleles. J Clin Invest 83:380-385, 1989.

Sheehy MJ, Meske LM, Embling M, Berkaw M, Rowe JR, Pandey JP. Lack of interaction of HLA and IgG heavy-chain allotypes in insulin-dependent diabetes mellitus. Exp and Clin Immunogenet, 6:269-274, 1989

Sheehy MJ, Meske LM, Emler CA, Rowe JR, Gimenez MHN, Ingle CA, Chan A, Trucco M, Mak TW. Allelic T-cell receptor alpha complexes have little or no influence on susceptibility to Type I diabetes. Hum Immunol, (1989) 26:261-271.

Rowe JR, Gimenez MHN, Emler CA, Sheehy MJ. HLA-DQA2 (DX Alpha) polymorphism and insulin-dependent diabetes. Hum Immunol, 29:256-262 (1990).

April, 1995

CURRICULUM VITAE

NAME:	Gary Alan Becker (S.S. #388-32-9290)
ADDRESS: WORK:	4860 Sheboygan Avenue 608-233-9300 Madison, WI 53705
HOME:	
DATE OF BIRTH:	
CITIZENSHIP:	United States by birth
FAMILY:	Married
EDUCATION:	1953-56, Marquette University (Pre-med) 1956-60, M.D., Marquette School of Medicine, Milwaukee, WI
POSTGRADUATE EDUCATION: (Internship and/or Residency)	1960-61, Intern, Milwaukee County General Hospital, Milwaukee, WI 1961-62, Resident, Milwaukee County General Hospital, Milwaukee, WI 1963-65, Resident, Milwaukee County General Hospital, Milwaukee, WI
MILITARY SERVICE:	1962-63, Captain, Medical Corps, USAF
OTHER EDUCATION: (e.g., Fellowships, etc.)	1965-67, Trainee in Hematology, Milwaukee County General Hospital, Milwaukee, WI 1967-69, Special Research Fellowships: National Institutes of Health, Milwaukee County General Hospital, Milwaukee, WI
BOARD CERTIFICATION:	1967, Certified, American Board of Internal Medicine 1973, Certified in Blood Banking, American Board of Pathology
FACULTY APPOINTMENTS:	1965-67, Instructor in Medicine, Marquette School of Medicine, Milwaukee, WI 1968-73, Assistant Professor of Medicine, Marquette School of Medicine, Milwaukee, WI 1973-75, Assistant Clinical Professor of Medicine, University of Wisconsin Medical School, Madison, WI

1975-present, Associate Professor of Medicine (Red Cross), University of Wisconsin Medical School, Madison, WI

NARCOTICS REGISTRATION #: AB3557898

STATE MEDICAL LICENSE #: 13997

OTHER APPOINTMENTS:

1969-70, Acting Executive Director, Milwaukee Blood Center, Inc., Milwaukee, WI

1970-73, Associate Medical Director, Milwaukee Blood Center, Inc., Milwaukee, WI

1972-74, Medical Director, Badger Regional Red Cross Blood Services, Madison, WI

1974-1/1991, Director of Badger Regional Red Cross Blood Services, Madison, WI

1/15/1991-present, Principal Officer, Red Cross Blood Services, Badger-Hawkeye Region, Madison, WI

PROFESSIONAL SOCIETIES:

Alpha Omega Alpha

American Association of Blood Banks

American Federation for Clinical Research

American Medical Association

American Society of Hematology

International Society of Blood Transfusion

American Society of Histocompatibility and Immunogenetics

Wisconsin Association of Blood Banks, President Elect 1973-74

COMMITTEES AND APPOINTMENTS:

Abstract Reviewer: Transfusion - 1974-1980

Committee on Blood Components, American Association of Blood Banks, Member 1972-1976

Committee on Quality Control, American Association of Blood Banks, Member 1973-1974

National Committee of Regional Blood Program Representatives of George M. Elsey, President of the American National Red Cross. Member 1973-1974

Task Force on Laboratory Testing and Component Preparations: Blood Resources Division of the National Heart and Lung Institute, Member 1972

Chairman - American Red Cross Blood Service Directors Council. September 1981-82

Member Board of Directors Great Lakes Hemophilia Foundation 1976-1986

Member Board of Directors LifeSource, Chicago, Illinois 1987-1990

Member NHLBI Coordinating Committee on Blood Donation and Transfusion Educational Program, 1987 -

Member Executive and Public Education Committees of National Blood Resource Education Program

Member Governor's Advisory Committee on HIV Infection, 1987 -

American Red Cross Directors Council, 1987 -

Member UW-OPO Advisory Board 1989 -

Donor Services Advisory Committee 1990 - present

ABSTRACTS

1. Becker GA, Abramoff P, Pisciotta AV. The effect of chlorpromazine on the primary and secondary immune response in rats. Clin Res 1966; 14:330.

2. Rodey GE, Becker, GA, Pisciotta AV. Casein-induced suppression of the hemolytic plaque response in mice. Clin Res 1967; 15:422.

3. Becker GA, Pisciotta AV. Effect of antigenic stimulation on DNA polymerase activity of rat spleen. Blood 1967; 30:885.

4. Burkert LB, Becker GA, Pisciotta AV. Ovarian malignancy and hemolytic anemia--demonstration of a hemolytic serum factor. Clin Res 1969; 17:531.

5. Becker, GA, Chalos MK, Nunke B, Tuccelli M, Aster RH. In vivo studies of platelet concentrates stored at room temperature. Presented at the 24th Annual Meeting of the American Association of Blood Banks, September 16, 1971, Chicago, IL.

6. Becker GA, Aster RH. Short-term platelet preservation at 22°C and 4°C. Fifth Conference on Blood Platelets, June 1-2, 1972, Oak Ridge, TN. Blood, October, 1972.

7. Edelstein AD, Becker GA. A comparison of HAA positive and negative blood donors at the Milwaukee Blood Center. Hepatitis Scientific Memoranda, June 1972.

8. Becker GA, Aster RH. Preparation and storage of platelets for transfusion. Clin Res 1972; 20(4):738.

9. Becker GA, Kunicki T, Aster RH. Effect of prostaglandin E_1 on harvesting of platelets from refrigerated whole blood. Transfusion 1973; 13:351.

10. Seifert P, Greiff D, Becker GA. Hemostatic effectiveness of cryopreserved human platelets. Transfusion 1973; 13:352.

11. Troyer P, Becker G. Objectives: the key to our new employee orientation program. Transfusion 1979; 5:630.

12. Mougey, R., Chrisenger, J., Becker, G. Anti Rodgers Caused by Transfusion of Plasma. Joint Meeting of the 18th Congress of the International Society of Hematology and 16th Congress of the International Society of Blood Transfusion. Montreal, Quebec, Canada, August 16-22, 1980.

13. Snyder AJ, Becker, GA. HTLV-III Screening with Abbott's EIA - The First Year. Transfusion 1986; 6:554.

CHAPTER, BOOK, ETC.

1. Becker, G.A.: Hepatitis-Associated Antigen (HAA) -- Methods of Testing. AABB Workshop Manual on Hepatitis Testing, September, 1971.

2. Becker, G.A., Chalos, Mary K., Tuccelli, M., and Aster, R.H.: Use of Prostaglandin E_1 in preparation and storage of platelet concentrates. In Prostaglandins in Cellular Biology. P.W. Ramwell & B.B. Pharriss eds, New York, Plenum Publ. Corp., 1972.

3. Becker, G.A.: Platelet Transfusion. In Special Transfusion Problems, American Association of Blood Banks Workshop Manual, 1972.

4, Becker, G.A. and Chalos, Mary K.: Chapter 10 -- "Blood Components" to be published in the edition of Technical Manual, American Association of Blood Banks.

5. Aster, R.H., Becker, G.A., Hamid, M., and Calvert, D.N.: Storage of platelet concentrated at 4°C: Use of refrigerated platelet concentrates in treatment of hemorrhage in thrombocytopenia. Platelets: Production, Function, Transfusion and Storage, Chapter 33, edited by Marion G. Baldini, M.D. and Shirley Ebbe, M.D.

6. Becker, G.A.: Component Therapy - In Current Therapy, edited by Howard F. Conn, M.D., W.B. Saunders, Company, Therapeutic Use of Blood Components :329, 1976.

7. Becker, G.A.: Platelet Transfusion - Some Current Issues. A Seminar on Blood Components: E Unum Pluribus, AABB 1977.

8. Becker, G.A.: Immune Hemolysis In Pathophysiology of Blood. Archie A. MacKinney, Jr., ed. Wiley Medical Series, 1984.

ARTICLES PUBLISHED OR ACCEPTED

1. Becker GA, Rossi EC. The interaction of hereditary persistence of fetal hemoglobin and beta thalassemia. Ann Intern Med 1966; 65:1071.

2. Becker GA, Pisciotta AV. Potentiation of hemolytic plaque formation by incubation of immunized spleen cells in phenothiazine derivatives. Proc Soc Exper Biol Med 1967; 124:764.

3. Becker, GA, Pisciotta AV. Hypochromic anemia with increased iron stores. Wis Med J 1967; 66:281.

4. Rodey GE, Becker GA, Pisciotta AV. Casein-induced suppression of the immune response in mice. Fed Proc 1968; 27:307.

5. Gustke SS, Becker GA, Garancis JC, Pisciotta AV. Nuclear fragmentation in mature polymorphonuclear leukocytes--a hitherto undescribed anomaly. Proc XII Cong Int Soc Haematol 1968: 145.

6. Burkert LB, Becker GA. Red Cell fragmentation syndromes. Marquette Med Rev 1969; 35:43.

7. Burkett LB, Becker GA, Pisciotta AV. Ibid. Ann Intern Med 1970; 73:91.

8. Gustke SS, Becker GA, Garancis JC, Geimer NF, Pisciotta AV. Chromatin clumping in mature leukocytes, a hitherto unrecognized abnormality. Blood 1970; 35:637.

9. Masouredia SP, Roseti DR, Stelloh RT, Perine J, Nehama ID, Hurst TM, Rimm, AA, Becker GA, Strel EA, Krenz SJ, Aster RH. Development of an automated blood inventory and information system for a regional transfusion service. Transfusion 1970; 10:182.

10. Duquesnoy RJ, Becker GA. Rapid screening for hepatitis antigen by immunoelectrodiffusion using paper discs. Transfusion 1970; 10:221.

11. Becker GA, Aster RH. Platelet transfusion therapy. Med Clin North Am 1972; 56:81.

12. Becker GA, Chalos MK, Tuccelli M, Aster RH. Prostaglandin E_1 in preparation and storage of platelet concentrates. Science 1972; 175:538.

13. Becker GA, Aster RH. Short-term platelet preservation. Clin Res 1972; 20(3): 480.

14. Becker GA, Aster RH. Red Blood cell transfusion. Transfusion 1973; 13:109.

15. Becker GA, Tuccelli M, Kunicki T, Chalos MK, Aster RH. Studies of platelet concentrates stored at 22°C and 4°C. Transfusion 1973; 13:109.

16. Becker GA, Aster RH. The impact of radioimmunoassay for hepatitis B antigen on blood banking and transfusion practices in Wisconsin. Wis Med J 1973; 72:138.

17. Becker GA, Kunicki T, Aster RH. Effect of prostaglandin E_1 on harvesting of platelets from refrigerated whole blood. J Lab Clin Med 1974; 83:304.

18. Becker GA. A plea to surgeons. Wis Med J 1973; 72:8.

19. Kunicki TJ, Tuccelli M, Becker GA, Aster RH. A study of variables affecting the qualify of platelets stored at "room temperature." Transfusion 1975; 15:414.

20. Aster RH, Becker GA, Filip DJ. Studies to improve methods of short-term platelet preservation. Transfusion 1976; 16:4.

21. Daneshbod-Skibba G, Shahidi NT, Becker GA, Martin J. Immune pancytopenia. Br J Haematol 1979; 43:7.

22. Briggs, NC, Piliavin JA, Lorentzen, D, Becker, GA. On Willingness to be a Bone Marrow Donor. Transfusion 1986; 4:324.

23. MacKenzie, WR, Davis, JP, Peterson, DE, Hibbard, AJ, Becker, GA, Zarvan, BS. Multiple False Positive Serologic Tests for HIV, HTLV-1 & Hepatitis C Following Influenza Vaccination 1991. JAMA 1992;288:1015-1017.

24. Reported by: BS Zarvan, AJ Hibbard, M.D., G Becker, M.D.. False-Positive Serologic Tests For Human T-Cell Lymphotropic Type I Among Blood Donors Following Influenza Vaccination - 1992. MMWR Vol 42/No 9; March 12, 1993; pp 173-175.

CURRICULUM VITAE

Name:	Alice Jane (A.J.) Hibbard
Maiden Name:	Alice Jane (A.J.) Snyder
Birthdate:	
Birthplace:	Chicago, Illinois
Marital Status:	Married
Home Address:	
Home Telephone:	
Business Address:	American Red Cross Blood Services Badger-Hawkeye Region 4860 Sheboygan Avenue Madison, WI 53705
Business Telephone:	(608) 233-9300
Education and Medical Training:	Degrees:

A.B. Magna cum laude, 1970
Bryn Mawr

M. Phil. (in cell & molecular biology),
1972 Yale

M.D., 1976
University of Illinois

Graduate Medical Training:

1976-78 (October) Residency in Diagnostic Radiology
Mayo Graduate School of Medicine

1978 (November)-1979 (October) Residency in Clinical Pathology
Martinez VA Hospital - California

1979 (November)-1982 (June) Residency in clinical pathology
Medical College of Wisconsin - Milwaukee

1982 (July)-1984 (June)
Fellowship in blood banking
Blood Center of Southeastern Wisconsin - Milwaukee

Board certified in Clinical Pathology & Blood Banking

Faculty Appointments:

Clinical Assistant Professor of Pathology and Laboratory Medicine, University of Wisconsin, 1986-present.

Other Appointments:

Associate Medical Director, American Red Cross Blood Services - Badger Region, 1984-1991.
Medical Director Blood Services - Badger Region, 1991-present. (Name changed to Badger-Hawkeye Region 6/93).

Professional Societies:

American Association of Blood Banks

Wisconsin Association of Blood Banks,
Vice President, 1987-1990
President, 1990-1992.
Past President, 1992-1993.

Committees:

Blood Products Utilization Review Committee, University of Wisconsin Hospitals. 1988-1992.

Presentations:

Numerous oral presentations at regional hospitals, regional blood bank and other technical association meetings, and in-services.

Publications:

Snyder, AJ, Zeevi, A, Gill, J, Casper, JT, Kirchner, P, Aster, RH, Menitove, J: "T4/T8 ratio and mitogen response in hemophiliacs." (Abstract) Transfusion 23:432, 1983

Snyder, AJ, Gottschall, J, Menitove, JE: "Is FFP used inappropriately?" (Abstract) Transfusion 24:420, 1984

Gill, JC, Maples, J, Nikaein, A, Kirchner, P, Lockhart, D, Snyder, AJ, Montogomery, RR, Casper, JT; "Inherited absence of the OKT 4 lymphocyte antigen in a chronically transfused patient with homozygous sickle cell disease." Journal of Pediatrics - 107:251-253, 1985

Snyder, AJ, Zeevi, A, Duquesnoy, R, Gill, J: "Mitogen responses and T4/T8 ratios in asymptomatic hemophilic patients." Transfusion 25: 313-316, 1985

Snyder, AJ, Gottschall, J, Menitove, JE: "Why is fresh frozen plasma transfused?" Transfusion 28: 107-112, 1986

Snyder, AJ, Becker, GA: "HTLV-III Screening With Abbott's EIA -- The First Year." (Abstract) Transfusion 26:554, 1986

Snyder, AJ, Vergeront, JM: "Safeguarding The Blood Supply by Providing Opportunities for Anonymous HIV Testing." New England Journal of Medicine 319: 374-375, 1988

Troyer, P, Becker, G, Hibbard, AJ, Roberts, R "Remote Autologous Blood Collection - A Regional Challenge." (Abstract) Transfusion 28, Supplement: 58S, 1988

Cochenet, D, Martin, J, Hibbard, AJ, Snow, J: "Hemolysis of Autologous Red Cells Associated with Non-Complement Binding IgA/IgM Cold Reacting Autoantibody." (Abstract) Transfusion 29, Supplement: 18S, 1989

MacKenzie, WR, Davis, JP, Peterson, DE, Hibbard, AJ, Becker, GA, Zarvan, BS. Multiple False Positive Serologic Tests for HIV, HTLV-1 & Hepatitis C Following Influenza Vaccination 1991. Journal of the American Medical Assoc. Brief Report, August 26, 1992; 1015-1017

Reported by: BS Zarvan, AJ Hibbard, MD., G Becker, MD. False-Positive Serologic Tests For Human T-Cell Lymphotropic Type I Among Blood Donors Following Influenza Vaccination - 1992; MMWR; Vol 42/No 9; March 12, 1993; PP 173-175.

CURRICULUM VITAE

George A. Gaucys

PROFESSIONAL EXPERIENCE

1985 - present — American Red Cross Blood Services
Badger Region - Madison, Wisconsin

Director of Histocompatibility Laboratory. Responsible for coordination of parentage testing and supervision of tissue typing. Duties include all aspects of HLA testing, serum screening, antibody identification, crossmatching, apheresis support, quality control, preparing and co-signing paternity reports.

1976-1985 — American Red Cross Blood Services
Mid-America Region - Chicago, Illinois

HLA Lab Supervisor. Responsible for all tissue typing, antibody screening, apheresis support and supervision of Platelet Antibody Laboratory. Since 1983, Coordinator of Paternity Laboratory. Responsible for HLA, RBC antigens, enzymes and serum proteins, preparation and signing of final reports, court appearances.

1972-1976 — Cook County Hospital Blood Bank
Chicago, Illinois

Supervisor for the HLA Laboratory. Responsible for antibody screening, antibody evaluation, serum exchange, tray preparation, and all tissue typing for apheresis and disease correlation.

1970-1971 — National Institute of Mental Health
Bethesda, Maryland

Technologist responsible for isolation and purification of myelin basic protein, PAGE determinations and basic research.

1967-1969 — St. Phillip High School
Chicago, Illinois

Biology and Physical Science instructor

1966-1967	St. Joseph and St. Anne Grammar School Chicago, Illinois 8th Grade Science teacher

EDUCATION

1966	B.S. - Biology Loyola University Chicago, Illinois
1971	M.S. - Biology Virginia State University Petersburg, Virginia

HONORS, AWARDS AND CERTIFICATIONS

1984	A.S.C.P.,B.B. Technologist
1976	Participation in 2nd cycle HLA Workshop of the Americas
1969-1970	National Science Foundation Academic Year Institute
1969	National Science Foundation Summer Institute

PROFESSIONAL MEMBERSHIPS

- American Society for Histocompatibility and Immunogenetics
- American Association of Blood Banks
- Wisconsin Association of Blood Banks

SCIENTIFIC PRESENTATIONS

"Epidemiological Aspects of HBsAg Based on Subtyping"
Tri-State Blood Bank Meeting, 1973

"HLA - Practical Applications", ASCP Workshop, 1977

"HLA Testing", Illinois Association of Medical Technologists, 1978

"WBC Antigens and Antibodies", SBB Review Workshop, ASCP, 1978

"HLA - Theory and Practice", Blood Bank Workshop, American Red Cross, 1978

"What's Special About My Blood?", Mid-America Red Cross Workshop, 1980

"WBC Antigens", ASCP CAAMA Regional Program in "Immunohematological Problems for Blood Bankers", Dr. Chang Lee, Director, 1979-1984.

"HLA & Paternity Testing", Paternity seminar, Badger Region American Red Cross, 1986

"DNA & Parentage Testing", Paternity seminar, Badger Region American Red Cross, 1988

"Back to Basics", Paternity seminar, Badger Region American Red Cross, 1990

"HLA and its Applications", Program to the Northern Illinois Blood Bank Society, 1991

"HLA - Theory and Practice" lecture to UW Medical Technology Class, 1991

DNA Theory and Application, Northern Illinois Blood Bank Society, 1992

DNA and Medical Technology - Wisconsin Association Medical Technology Meeting, Oshkosh, 1992

"What You Want To Know About DNA" - Blood Bank Society Meeting, 1992

"Who's Who in Paternity Testing", Paternity testing seminar, Badger-Hawkeye Region American Red Cross, 1993

"Improved Paternity Testing", Medical Technologist radio program, 1994

"Principles of Paternity Testing", U.W. Medical Technologist lecture, 1994

SCIENTIFIC PUBLICATIONS

Behzad O, Wong C, Gaucys G, Lee CL. Lack of exclusion of paternity. Transfusion 1980;4:20.

Behzad O, Gaucys G, Wong C. A possible Kidd antigen variant. Transfusion 1980;4:20.

QUALIFIED EXPERT WITNESS

Qualified as expert witness in 50 disputed paternity cases in state of Wisconsin since 1985.

Curriculum Vitae

Paul Michael DeLuca, Jr.

Professor of Medical Physics
Department of Medical Physics
University of Wisconsin-Madison
Madison, WI 53706

4

Citizenship: USA

Marital Status:
Married
Wife: Florence K.

Education:

University of Notre Dame Notre Dame, Indiana	Ph.D. Nuclear Physics	1966-1971
LeMoyne College Syracuse, New York	B.S. Physics, Math	1962-1966

Professional Experience:

Chairman Department of Medical Physics University of Wisconsin-Madison Madison, WI	1987-Present

Vice-Chairman Department of Medical Physics University of Wisconsin-Madison Madison, WI	1982 -1987
Professor Department of Medical Physics University of Wisconsin-Madison Madison, WI	1985-Present
Associate Professor Department of Medical Physics University of Wisconsin-Madison Madison, WI	1981-1985
Assistant Professor Medical Physics Division Department of Radiology University of Wisconsin-Madison Madison, WI	1975-1981
Adjunct Assistant Professor Medical Physics Division Department of Radiology University of Wisconsin-Madison Madison, WI	1974-1975
Assistant Scientist Medical Physics Section Department of Radiology University of Wisconsin-Madison Madison, WI	1973-1974
Postdoctoral Research Associate Medical Physics Section	1971-1973

Department of Radiology
University of Wisconsin-Madison
Madison, WI

Membership in Professional Societies:
American Association of Physicists in Medicine
Americal Physical Society
Health Physics Society
North Central Chapter of Health Physics Society
North Central Chapter of American Association of Physicists in Medicine

Consulting Experience:
Radiation Safety, Radiological Physics:
Meriter Hospital, Madison, WI

Lawrence Livermore National Laboratory
Livermore, CA

Radiation Safety Consultant, Zikonix,
Sunnyvale, CA

Radiation Safety Consultant, General
Electric Co., Medical Systems Division,
Milwaukee, WI

Radiological Physics
Cetus Madison Corporation
Middleton, WI

Radiological Physics
Hazelton Raltech
Madison, WI

Loma Linda Medical Center

Proton Therapy Facility
Loma Linda, CA

Fermi National Laboratory
Medical Accelerator Group
Argonne, IL

Harper-Grace Hospital
Cyclotron Facility
Detroit, MI

Research
Research Support:

1. National Cancer Institute–Division of Cancer Research Resources and Centers
   No. 2R01 CA13469-04
   Neutron Radiation Cancer Therapy Source
   September 1, 1975–August 31, 1978
   $497,650.00
   Role: Principal Investigator

2. University of Wisconsin Graduate School Research Committee
   No. 150924
   Ionization Induced Tritium Labelling of Organic Compounds
   July 1, 1974–June 30, 1976
   $40,000
   Role: Co-Principal Investigator with Oliver Smithies

3. University of Wisconsin Graduate School Research Committee
   No. 100511
   Gamma Irradiator: installation of a γ-Ray Source to Permit Simultaneous
   Photon and Neutron Mixed Field Experiments in Dosimetry and Radiobiology
   July 1, 1979–June 30, 1980

$10,000
Role: Principal Investigator

4. University of Wisconsin Graduate School Research Committee
   No. 110676
   Simultaneous Photon-Fast Neutron Beam Irradiator
   July 1, 1980–June 31, 1981
   $6,144.00
   Role: Principal Investigator
   Funds not used - USDOE Funds Awarded

5. Department of Energy
   No. EY-76-S-02-1105
   Fast Neutron Dosimetry
   November 1, 1978–October 31, 1979
   $74,000
   Role: Co-Principal Investigator with F.H. Attix

6. Department of Energy
   No. DE-AC02-76EV01105
   Fast Neutron Dosimetry
   November 1, 1979–October 31, 1980
   $88,000
   Role: Co-Principal Investigator with F.H. Attix

7. Department of Energy
   No. DE-AC02-76EV01105
   Fast Neutron Dosimetry
   November 1, 1980–October 31, 1981
   $90,000 requested
   Role: Co-Principal Investigator with F.H. Attix

8. Department of Health, Education and Welfare
   University of Wisconsin Graduate and Postdoctoral Research Training Program
   in Radiological Sciences
   July 1, 1976–July 1, 1981
   $774,000

Role: Trainor
Program Director: John R. Cameron

9. Department of Energy
No. DE-AC02-76EV01105
Fast Neutron Dosimetry
January 1, 1983–December 31, 1983
$120,000
Role: Principal Investigator

10. Department of Energy
No. DE-AC02-76EV01105
Fast Neutron Dosimetry
January 1, 1984–December 31, 1984
$125,000
Role: Principal Investigator

11. Department of Energy
No. DE-AC02-76EV01105
Fast Neutron Dosimetry
January 1, 1985–December 31, 1986
$120,000
Role: Principal Investigator

12. Department of Energy
No. DE-FC02-84ER40183
Fast Neutron Kerma Measurements
September 1, 1984–January 10, 1987
$71,500
Role: Co-Principal Investigator with H.H. Barschall

13. Department of Energy
No. DE-FG02-86ER60417
Fast Neutron Dosimetry
February 1, 1987–January 31, 1988
$105,000
Role: Principal Investigator

14. Department of Energy
    No. DE-FG02-84ER40183, Mod. 3
    Fast Neutron Kerma Measurements
    February 15, 1987–February 14, 1988
    $40,000
    Role: Co-Principal Investigator with H.H. Barschall

15. Department of Energy
    No. DE-FG02-86ER60417
    Fast Neutron Dosimetry
    February 1, 1989–January 31, 1992
    $95,000
    Role: Principal Investigator

16. National Institutes of Health
    No. 1-R01-HL38744-01
    Characterization of Lung Phospholipid Transfer Proteins
    August 1, 1987–July 31, 1990
    $68,269
    Role: Consultant with Principal Investigator Francis H. C. Tsao

17. National Institutes of Health
    No. CA 14520-16
    Cancer Center Support (comprehensive)
    April 1, 1988–March 31, 1993
    04/01/88-03/31/93
    $1,570,827
    Role: Staff Investigator with Principal Investigator Paul Carbone

18. Wisconsin Innovarium, Ltd., Milwaukee, WI
    Support of Research and Graduate Assistants in the Field of Medical Physics
    July 1, 1987 - Indefinite
    $60,000
    Role: Principal Investigator

19. National Institutes of Health
    Radiobiology of Synchrotron-produced Ultrasoft X-rays

February 1, 1991–January 31, 1994
$160,179
Role: Co-Principal Investigator with Michael Gould

20. UW Graduate School Research Committee
Fast Neutron Dosimetry
June 30, 1991–July 1, 1992
$3,300
Role: Principal Investigator

21. Department of Energy
No. DE-FG02-86ER60417
Fast Neutron Dosimetry
February 1, 1992–January 31, 1993
$110,000
Role: Principal Investigator

22. National Institutes of Health, NRSA
CA 09206-11
U.W. Radiological Sciences Training Program
August 1, 1978–May 31, 1994
$227,635
Role: Program Director and Principal Investigator

23. Department of Energy
No. DE-FG02-86ER60417
Fast Neutron Dosimetry
February 1, 1993–January 31, 1994
$115,000
Role: Principal Investigator

24. Department of Energy
No. DE-FG02-86ER60417
Fast Neutron Dosimetry
February 1, 1994–January 31, 1995
$75,000
Role: Principal Investigator

25. UW Graduate School Research Committee
Investigation of the Dosimetric Properties of
Small Beryllium Diodes and Scintillators for
Energetic Proton Therapy Applications.
July 1, 1994–June 30, 1995
$15,204
Role: Principal Investigator

26. National Institutes of Health
Individual National Research Service Award Application
A Computer Simulation System for Proton Radiotherapy
September 1, 1993–August 31, 1995
09/01/93-08/31/94; $23,700
Fellowship Applicant: Joseph O. Deasy
Role: Principal Investigator/Sponsor

27. UW Medical School Research Committee
Collaborative Experiment at Physikalisch Technische
Bundesanstalt, Braunschweig, Germany
January 1, 1994–June 30, 1994; $1,000
Role: Principal Investigator

Invited Talks:

- Spins, Parities, Transition Rates, and Branching Ratios for ^{34}Cl, Nuclear Physics Seminar, Department of Physics, University of Wisconsin-Madison, 1972.

- Development of an Intense Source of Fast Neutrons Suitable for Cancer Treatment, Medical Physics Seminar, Department of Radiology, University of Wisconsin-Madison, 1976.

- Health Physics Problems with Handling of Large Quantities of Tritium, North Central Chapter, Health Physics Society, Madison, WI, 1977.

- Physical and Dosimetric Properties of DT Neutron Sources for Radiotherapy, Joint Biophysical Sciences Seminar, University of Minnesota, Minneapolis, MN, 1978.

- Application of a 15 MeV Gas Target Neutron Source, Nuclear Physics Seminar, Department of Nuclear Physics, University of Wisconsin-Madison, 1977.

- Neutron Shielding Aspects of High Energy Accelerators, North Central Chapter, American Association of Physicists in Medicine, Marshfield Clinic, WI, 1978.

- Health Physics Operation of a Fast Neutron Facility, North Central Chapter of Health Physics Society, Madison, WI, 1980.

- USDOE Executive Session Workshop on Personnel Neutron Dosimetry, Battelle Conference Center, Seattle, Washington, 1980.

- USDOE Executive Advisory Committee on Neutron Personnel Dosimetry, USDOE, Washington D.C., December 1980.

- Radiological Physics-Health Physics: General Electric Medical Systems Division: Nuclear Medicine Section: Milwaukee, Wisconsin, August, 1981.

- Short Course on Radiotherapy Safety, AAPM, Madison, Wisconsin, March, 1982.

- Microdosimetric Techniques Applied to Fast Neutron Measurements, "The Neutron Biological Effects–Hazards and Medical Applications," Spring Symposium of Great Lakes Chapters of the Health Physics Society and AAPM, Detroit, Michigan, April 1983. (This paper was judged the "Best Scientific Presentation")

- Plastic-gas, Graphite Proportional Counters, Neutron Kerma Factor Measurements – What Was Learned, Neutron Dosimetry Symposium, Annual Meeting of the Health Physics Society, 1984, New Orleans, LA.

- Neutron Kerma Factor Measurements Using Microdosimetric Techniques, "Dosimetry Applications," Eighth Conference on the Application of Accelerators in Research and Industry, 1984, Denton, TX.

- National University of Mexico–UNAM, Institute of Physics Mexico City, October 1988.
  - "Medical Physics in the Frozen North."
  - "Fast Neutron Kerma Factors for Low-Z Elements"
- Tenth Accelerator Applications Conference, Denton, Texas, "Corrections to Kerma Factors Measurements Made by Integral Techniques," November 1988.
- International Atomic Energy Agency meeting, Vienna, Austria, Second Research Coordination Meeting on NUCLEAR DATA NEEDED FOR NEUTRON THERAPY, January 24-27, 1989.
  - "Corrections to Kerma Factors for Bombarding Energies about 15 MeV,"
- Department of Physics Colloquium, University of Wisconsin-Madison, "Heavy Ion Treatment of Cancerous Lesions," February 3, 1989.
- Proton Therapy Cooperative Group X'th Meeting, FERMILAB, Batavia, IL, "Shielding Experiments: 100-200 MeV Proton Synchrotron," April 3-4, 1989.
- U.S. Department of Energy OHER, Berkeley, CA, "Several Aspects of Neutron Production by 250 MeV Protons," June 25-28, 1990.
- American Institute of Physics Division of Nuclear Physics, Plenary Invited Session PA: Nuclear Physics in Society, "Recent Advances in the Use of Particle Accelerators for Radiation Therapy," Champaign-Urbana, IL, October 25-26, 1990.
- G. E. Medical Systems, "Radiological Physics for Engineers," Waukesha, WI, November 8, 1990.
- International Atomic Energy Agency meeting, Brussels, Belgium, Third Research Coordination Meeting on NUCLEAR DATA NEEDED FOR NEUTRON THERAPY, January 7-11, 1991.

- Joint SAAPMB/MRC Summer School and 31st Annual SAAPMB Congress, March 11-15, 1991, Cape Town, South Africa. Four papers presented:
  - "Neutron Production and Shielding for a 250 MeV Proton Synchrotron"
  - "Instrumentation for a Treatment Nozzel for a 250 MeV Proton Synchrotron"
  - "Radiation Physics and Biology of Ultrasoft X-rays"
  - "Neutron Kerma Factors for Low-Z Elements from 15 to 30 MeV"
- Instituto Nacional de Investigaciones Nucleares meeting, Mexico City, Mexico, Second National Meeting about Accelerators, "The Use of Protons in Radiation Therapy," May 21-24, 1991.
- G. E. Medical Systems, short courses in Radiation Physics presented in 1991 (June 25, November 19, and December 5); 1992 (April 17 and May 8); 1993 (April 1 and 19, May 27, and July 23); and 1994 (January 13 and February 3).
- Seventh Symposium on Neutron Dosimetry, Berlin, October 14-20, 1991. Two papers presented:
  - Siebers JV, DeLuca Jr. PM, Pearson DW, and Coutrakon G, "Measurement of Neutron Dose Equivalent and Penetration in Concrete for 230-MeV Proton Bombardment of Al, Fe, and Pb Targets,"
  - Hartmann CL, DeLuca Jr. PM, and Pearson DW, "Measurement of Neutron Kerma Factors in C, O, and Si at 18, 23, and 25 MeV,"
- University of Notre Dame Department of Physics Colloquium, South Bend, IN, March 4, 1992, "Proton Radiation Therapy–Has it Finally Come of Age?"
- American Nuclear Society Topical Meeting, April 26-May 1, 1992, "Fast Neutron Kerma Factors–Recent Determinations Below 100 MeV"

- AAPM 1992 Annual Meeting, Calgary, Canada, "Status of the Education and Training of Medical Physicists."
- Cleveland Area Medical Physics Society, November 4, 1992, "Proton Radiation Therapy: A New Modality."
- Harper-Grace Hospital/Wayne State University, January 14, 1993, Detroit, MI, "Physical Aspects of Heavy Charged Particle Therapy."
- University of Wisconsin Department of Engineering Professional Development Telecommunications Series Program, *Cellular Radio*, May 11-14, 1993, "Electromagnetic Radiation and Your Health."
- Massachusetts Institute of Technology, June 17, 1993, Cambridge, MA, "Integral Determinations of Fast Neutron Kerma Factors."

Publications:

1. "Angular Correlation Studies in $^{32}S(^{3}He,p\gamma)^{34}Cl$," P.M. DeLuca, Jr., J.C. Lawson, P.R. Chagnon, and E.D. Berners, *Nucl. Physics*, **A173** (1971) 307-320.

2. "High Flux Neutron Source for Radiation Therapy," C.A. Kelsey, G.C. Spalek, P.M. DeLuca, Jr., G.M. Chenevert, E.C. McCullough, and R.J. Nickles, Proceedings of the Workshop on High Intensity Neutron Generators, Las Vegas, NV, June 1972, 147-158.

3. "A Recirculating Gas Target Neutron Source for Radiation Therapy," C.A. Kelsey, G.C. Spalek, P.M. DeLuca, Jr., E.C. McCullough, G.M. Chenevert, and R.J. Nickles, Proceedings of the First Symposium on Neutron Dosimetry in Biology and Medicine, Munchen, Germany, May 1972, 811.

4. "Performance of a Moderate Intensity Ion Source and Accelerator for Use in Neutron Radiotherapy," P.M. DeLuca, Jr., J.R. Tesmer, G.M. Chenevert, R.P. Torti, and C.A. Kelsey, Proceedings of the Second Symposium on Ion Sources and Formation and Ion Beams, Berkeley, CA, October 1974, VII 12-1-VII 12-5.

5. "Recent Progress in the Design, Construction, and Operation of a Neutron Gas Target Source for Cancer Therapy," C.A. Kelsey, P.M. DeLuca, Jr., G.M. Chenevert, J.R. Tesmer, and R.P. Torti, Proceedings of the Second Symposium on Neutron Dosimetry in Biology and Medicine, Munchen, Germany, September 1974, 971-977.

6. "Radiation Protection Aspects of a High Flux, Fast Neutron Generator," P.M. DeLuca, Jr., R.P. Torti, G.M. Chenevert, J.R. Tesmer, and C.A. Kelsey, Proceedings of the Ninth Midyear Topical Symposium of the Health Physics Society, Denver, CO, February, 1976, p. 480-485.

7. "A Tritium Gas Target as an Intense Source of 14 MeV Neutrons," G.M. Chenevert, P.M. DeLuca, Jr., C.A. Kelsey and R.P. Torti, Nucl. Instru. and Methods, **145** (1977) 149-155.

8. "Amino Acid Sequence Determination of Proteins Labelled in Tritium Gas by Microwave Discharge," B.W. Wessels, D.J. McKean, N.C. Lein, C. Shinnick, P.M. DeLuca, Jr., and O. Smithies, Radiat. Research, **74** (1978) 35-50.

9. "Performance of a Gas Target Neutron Source for Radiotherapy," P.M. DeLuca, Jr., R.P. Torti, G.M. Chenevert, N.A. Detorie, J.R. Tesmer, and C.A. Kelsey, Phys. Med. Biol. **23** (1978) 876-887.

10. "A High Intensity Gas Target T(d,n) Source," P.M. DeLuca, Jr., R.P. Torti, G.M. Chenevert, and M.E. Brandan, Proceedings of the Fundamental and Practical Aspects of the Application of Fast Neutrons and Other High LET Particles in Clinical Radiotherapy, Rijswijk, the Netherlands, 1979.

11. "Comparative n-γ Dose Measurements in a Water Phantom for 14.8 MeV Neutrons," F.H. Attix, D.W. Pearson, S.J. Goetsch, and P.M. DeLuca, Jr., Ion Chambers for Neutron Dosimetry, Commission of European Communities, Brussels, 1980, EUR6782 EN, 321-324.

12. "Ionization Error Due to Porosity in Graphite Ionization Chambers," D.W. Pearson, F.H. Attix, P.M. DeLuca, Jr., S.J. Goetsch, R.P. Torti, Ion Chambers for Neutron Dosimetry, Commission of European Communities, Brussels, 1980, EUR6782 EN., 325-326.

13. "A Detector for the Direct Measurement of LET Distributions from Irradiation with Fast Neutrons," M.E. Brandan and P.M. DeLuca, Jr., Proceedings of the Seventh Symposium on Microdosimetry, Oxford, U.K., Commission of European Communities, Brussels, September 1980, 697-708.

14. "Neutron and Photon Dose Components in a 15 MeV Neutron Beam Determined with a Graphite-Walled Proportional Counter," P.M. DeLuca, Jr., P.D. Higgins, D.W. Pearson, and F.H. Attix, Proceedings of the Seventh Symposium on Microdosimetry, Oxford, U.K., Commission of European Communities, Brussels, September 1980, 1159-1168.

15. "A Detector for the Direct Measurement of LET Distributions from Irradiation with Fast Neutrons," M.E. Brandan and P.M. DeLuca, Jr., *Radiat. Res.* **83** (1980) 255-269.

16. "Comparison of the Bragg-Gray Theory Corollaries to Fast-Neutron Cavity Ionization Measurements at 14.8 MeV," F.H. Attix, D.W. Pearson,

    P.M. DeLuca, Jr. and S.J. Goetsch, *Health Physics* **38** (1980) 623-633.

17. "Ionization Error Due to Porosity in Graphite Ionization Chambers," D.W. Pearson, F.H. Attix, P.M. DeLuca, Jr., S.J. Goetsch, and R.P. Torti, *Phys. Med. Biol.* **25** (1980) 333-338.

18. "A Tandem Irradiation Fast Neutron and ^{60}Co Facility," P.M. DeLuca, Jr., P.D. Higgins, D.W. Pearson, F.H. Attix, and M.N. Gould, Proceedings of the Fourth Symposium on Neutron Dosimetry, Munich-Neuherberg, Commission of European Communities, Brussels, June, 1981, 55-64.

19. "Development of an A150-Plastic Equivalent Gas for Ionization Chamber and Microdosimetric Measurements of 14.8 MeV Neutron Doses," P.M. DeLuca, Jr., F.H. Attix, D.W. Pearson, P.D. Higgins, M. Schell and M. Awschalom, Proceedings of the Fourth Symposium on Neutron Dosimetry, Munich-Neuherberg, Commission of European Communities, Brussels, June, 1981, 267-278.

20. "Calculated and Measured HTO Atmospheric Dispersion Rates Within Meters of a Release Site," P.M. DeLuca, Jr., J.A. Bauhs, and D.W. Pearson, *Health Physics*, **41** (1981) 191-195.

21. "Measurement of OER and RBE for Mono-Energetic 2.5 and 14.3 MeV Neutrons and Correlation with LET," P.D. Higgins, P.M. DeLuca, Jr., D.W. Pearson, and M.N. Gould, *Int. J. Rad. Biol.*, **40** (1981) 313-319.

22. "Application of A150 Plastic-Equivalent Gas in A150 Plastic Ionization Chambers for ^{60}Co γ-Rays and 14.8 MeV Neutrons," P.M.

DeLuca, Jr., F.H. Attix, D.W. Pearson, and M. Awschalom, *Med. Phys.*, **9** (1982) 378-384.

23. "Characteristics of A-150 Plastic-equivalent Gas in A-150 Plastic Ionization Chambers for p(66)Be(49) Neutrons," M. Awschalom I. Rosenberg, R.K. Ten Haken, D.W. Pearson, F.H. Attix, and P.M. DeLuca, *Med. Phys.* **9(6)** (1982) 884-887.

24. "Rat Mammary Cell Survival Following Irradiation with 14.3-MeV Neutrons," P.A. Mahler, M.N. Gould, P.M. DeLuca, Jr., D.W. Pearson, and K.H. Clifton, *Radiat. Res.* **91** (1982) 235-242.

25. "V79 Survival Following Simultaneous or Sequential Irradiation by 14.8 MeV Neutrons and ^{60}Co Photons," P.D. Higgins, P.M. DeLuca, Jr., D.W. Pearson, and M.N. Gould, *Radiat. Res.* **95** (1983), 45-56.

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16. Calculated and Measured HTO Atmospheric Dispersion Rates Within Meters of a Release Site, P.M. DeLuca, Jr., J.A. Bauhs, and D.W. Pearson, USDOE EV/01105-277.

17. Aladdin Radiation Safety Report, J.A. Bauhs, P.M. DeLuca, Jr., and E.M. Rowe, Wisconsin Medical Physics Report WMD-118, 1980.

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20. A Semi-Phenomenological Method for Applying Microdosimetry in Estimating Biological Response, P.D. Higgins, P.M. DeLuca, Jr., D.W. Pearson, and M.N. Gould, USDOE EV/01105-283.

21. Application of A150-Plastic Equivalent Cases in Microdosimetric Measurements, P.M. DeLuca, Jr., P.D. Higgins, D.W. Pearson, M.C. Schell and F.H. Attix, USDOE EV/01105-284.

22. Fast Neutron and Photon Doses Determined with Proportional Counters and an Ionization Chamber, P.M. DeLuca, Jr., P.D. Higgins, M.D. Schell, and D.W. Pearson, USDOE EV/01105-285.

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26. Operation of a Hemispherical Detector for LET Measurements, M.C. Schell, P.M. DeLuca, Jr., and D.W. Pearson, USDOE EV/01105-301.

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34. Measured Neutron Carbon Kerma Factors From 14.1 to 18 MeV, P.M. DeLuca, H.H. Barschall and R.C. Haight, USDOE EV/01105-313.

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36. Fast Neutron Dosimetry, Progress Report for the period 1-December-88 to 30-November-1989, P.M. DeLuca, Jr., M.N. Gould, D.W. Pearson, F.H. Attix, and H.H. Barschall, USDOE Report # DOE/ER/60417-001.

37. Fast Neutron Dosimetry, Progress Report for the period 1-December-89 to 30-November-1990, P.M. DeLuca, Jr., M.N. Gould, D.W. Pearson, F.H. Attix, and H.H. Barschall, USDOE Report # DOE/ER/60417-002.

38. Low-energy Beta Ray Thermoluminescent Dosimetry, R. Carrillo and P.M. DeLuca, Jr., WMP Report 189.

39. High Level Gamma Ray Thermoluminescent Dosimetry, R. Carrillo and P.M. DeLuca, Jr., WMP Report 190.

40. U.V. Dosimetry with Thermoluminescent Materials, R. Carrillo and P.M. DeLuca, Jr., WMP Report 191.

41. The Use of Energetic Protons for Radiation Therapy, P.M. DeLuca, Jr., WMP Report 193.

Public Service:

Program Project Review: Intense Neutron Source Target Test Facility: Sandia Laboratories, Albuquerque, New Mexico, 1978.

Fast Neutron Facility: Siting Review and Recommendation Committee: Illinois Cancer Council, Chicago, Illinois, 1979.

Neutron Cancer Therapy - Radionuclide Production Facility: Operations Review Group: Illinois Cancer Council, Chicago, Illinois, 1980.

Member of the Training of Medical Physicists Committee: American Association of Physicists in Medicine, 1980-1983.

Member of the Neutron Personnel Dosimetry Advisory Panel for USDOE Contractors, United States Department of Energy, 1983.

Member of the Shared Resource Committee: National Institutes of Health, Washington DC, 1983.

Member of Program Project Review Committee, Radiological Physics Section, Battelle Pacific North West Laboratory, Richland, WA, United States Department of Energy, 1984.

Member of Cyclotron Advisory Panel, Univ. of California at Los Angeles, National Cancer Institute, Washington, DC, 1984-198€.

Member of National Council on Radiation Protection Committee #68, 1981-1985

Associate Chairman: Symposium: Presentation of Professional Self in Everyday Life: Annual Meeting of the American Association of Physicists in Medicine, 1980.

Chairman: Mini-Symposia: Proton Therapy–Has It Come of Age: Annual Meeting of the American Association of Physicists in Medicine, 1991

Chairman: Radioactivity Measurements Session: Annual Meeting of Health Physics Society, 1980.

Manuscript Reviewer: Radiation Research, Medical Physics, Physics in Medicine and Biology, Health Physics, and Radiology.

Book Reviewer: Medical Physics

Research Proposal Reviewer: United States Department of Energy: Office of Health and Environmental Health, National Science Foundation.

Member: Academic Program Directors Committee; Health Physics Society.

Member: Annual Meeting Program Committee, Health Physics Society, 1982-1985.

Chairman: Annual Meeting Program Committee, Health Physics Society, 1985.

Chairman: American Association of Physicists in Medicine Committee on Education & Training of Medical Physicists, 1987-1992

Chairman: American Association of Physicists in Medicine Nominating Committee of Education Council, 1992

Member: American Association of Physicists in Medicine Ad Hoc Committee on Electronic Archival and Communication, 1993

Member: American Association of Physicists in Medicine Education Council, 1988-1993

Member: American Association of Physicists in Medicine Accreditation Committee, 1989-present

Member: American Association of Physicists in Medicine American Physical Society Physics Planning Committee, 1995

Member, Health Physics Society Education and Training Committee, 1991-present

Member, Proton Therapy Co-Operative Group, Loma Linda University, 1989-1992

Organizer and Session Chairman, American Association of Physicists in Medicine Proton Therapy Symposium, July 24, 1991.

Member, International Atomic Energy Agency Coordinated Research Program on Nuclear Data Needed for Neutron Therapy, 1987-present

Session Chairman, "Dosimetry for Proton and Fast Neutron Therapy," Seventh Symposium on Neutron Dosimetry, Berlin, October 15, 1991.

Program Committee: Seventh Symposium on Neutron Dosimetry, Berlin, October 15, 1991.

Member, International Committee on Radiation Units and Measurements Committee on Proton Therapy, 1990-present

Chairmen: Program Committee, 30'th Annual Meeting of Health Physics Society, 1985.

Chairman, MEDPAC Initiative, Lawrence Livermore National Laboratory, 1992-present

Chairman, Board of Directors, Medical Physics Publishing Company, Madison, WI, 1992-present

Representative: for University of Wisconsin to the High Level Geological Repository Radioactive Waste Technical Advisory Committee to State of Wisconsin Legislator.

Representative: for University of Wisconsin to Governor's Ad Hoc Committee on Low Level Radioactive Waste.

Member: SBIR Review Panel, National Institutes of Health, 1989–present

Chairman, SBIR/R01 Review Panel, National Institutes of Health, February 21, 1993.

Member of USDOE Site Visit Review Team, Oak Ridge National Laboratory, February 16 & 17, 1993.

Member, Commission on International Commission on Radiation Units and Measurements, Inc., 1993.

University Services:

1976– Director: Masters of Science Degree–Health Physics Option. During 1974-1977 a parallel option to the M.S. degree in Medical Physics was developed. This program blends core courses in Radiological Sciences and Nuclear Engineering. Candidates are trained for careers in Health Physics–Radiation Protection at Medical, Industrial, and Power Generation facilities. Starting with a single graduate student, this program has expanded to contain an M.S. candidate enrollment comparable to the Medical Physics Option.

1977– Member: Executive Committee, Medical Physics Division, Department of Radiology. This committee functions as an advisory group to the Director of Medical Physics in all academic and administrative responsibilities.

1976– Ad Hoc M.S. Qualifiers Committee, Medical Physics Division, Department of Radiology.

1976– University Radiation Safety Committee: Vice-chairman 1979-1980 and Chairman from 1981-1983. This chancellor-appointed committee is directly responsible for the management of the University's USNRC Type A Broad License as well as all other aspects of safety involving ionizing radiation.

1982–1987– Vice-Chairman, Department of Medical Physics.

1987– Chairman, Department of Medical Physics.

1987– Member, Basic Science Chairperson Caucus.

1990– Faculty Advisory Committee (Elected committee of the Faculty of the School of Medicine).

1990–1991– Member, University Graduate Assistant Stipend Committee (Dean of Graduate School Appointment)

1991- Chair, Search Committee for Chair of Pathology Department, 1992 (Dean of Medical School Appointment)

1991– Member, Leaders Group University of Wisconsin Clinical Cancer Center Core Grant Renewal

1991– Member, Center for X-ray Lithography MRL Executive Committee

1991– Member, Nuclear Engineering and Engineering Physics Academic Review Committee, (Dean of Engineering Appointment)

1990– Physical Sciences Laboratory Advisory Committee (Dean of Graduate School Appointment)

1992– Chairman, Accredited Dosimetry Calibration Laboratory Advisory Committee

1992– Member, CHS Track Working Group of Faculty Advisory Committee

1992– Member, Physics Department Ad Hoc Committee on Adjunct Professor Appointment (Chairman of Physics Department Appointment)

1992– Member, Computers for Medical School Task Force Committee (Dean of Medical School Appointment)

1992– Member, Committee Related to University-Industry Activities in the Medical School (Dean of Medical School Appointment)

1993– Chair, Faculty Advisory Committee (Elected by Medical School Faculty)

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

Individuals fitting this description fit into two categories: 1.) radiation workers and 2.) individuals frequenting restricted areas.

TRAINING PROGRAM
for Users of Unsealed Radionuclides and Irradiator Operators

The training of staff members who will be using unsealed radionuclides and/or the irradiator shall consist of at least five (5) hours of instruction and a minimum of four (4) hours of on-the-job training in the actual use and/or operation, conducted by the Radiation Safety Officer and/or designee.

The training shall consist of the physics and mathematics basic to radiation, the interactions of radiation with matter, dosimetry, basic radiation protection procedures, biological effects of radiation exposure, methods of monitoring radiation fields, rules and regulations of radiation protection operating procedures, record keeping and, if appropriate, operation of the irradiator.

SUBJECT	TIME
Introduction	10 minutes
Radioactivity and Radiation	90 minutes
Biological Effects and Risks of Radiation	60 minutes
Maximum Permissible Radiation Dose	30 minutes
Radiation Detection Instrument Use	30 minutes
Personnel Monitoring	30 minutes
External Radiation Hazards and Protection	20 minutes
Internal Radiation Hazards and Protection	30 minutes
Applicable Regulations 10 CFR parts 19 & 20	30 minutes
Facility License and Its Conditions	30 minutes
Design and Operation of the Irradiator (if applicable)	30 minutes
Operating and Emergency Procedures	40 minutes

Individuals completing this training will be given a test to insure competency. The exam will be composed of at least 25 questions. A score of 80% or better must be obtained before an individual is classified as a radiation worker.

Lectures will be supplemented by a minimum of four (4) hours of on-the-job training under the supervision of the Radiation Safety Officer and/or designee. A person must satisfactorily complete classroom and on-the-job training before they are approved to use the irradiator or unsealed radionuclides. The Radiation Safety Officer has final responsibility for determining that a staff member is qualified to use the irradiator or unsealed radionuclides based on acceptable completion of the training program.

In addition, at least one hour of training will be conducted annually for all radiation users and will include the following subject matter:

1. Requirements of 10 CFR-19.12.
2. Review of Facility License and Its Conditions
3. Review of Operating and Emergency Procedures

TRAINING PROGRAM
for individuals frequenting restricted areas

The training of staff members and any other personnel who have access to restricted areas but will <u>not</u> be using unsealed radionuclides or the irradiator shall be conducted by the Radiation Safety Officer and shall consist of the following:

1. Location of radioactive materials.
2. The appropriate precautions to take near such areas.
3. What to do in case of an emergency or any unusual situation.
4. Restriction of unauthorized entry into restricted areas.

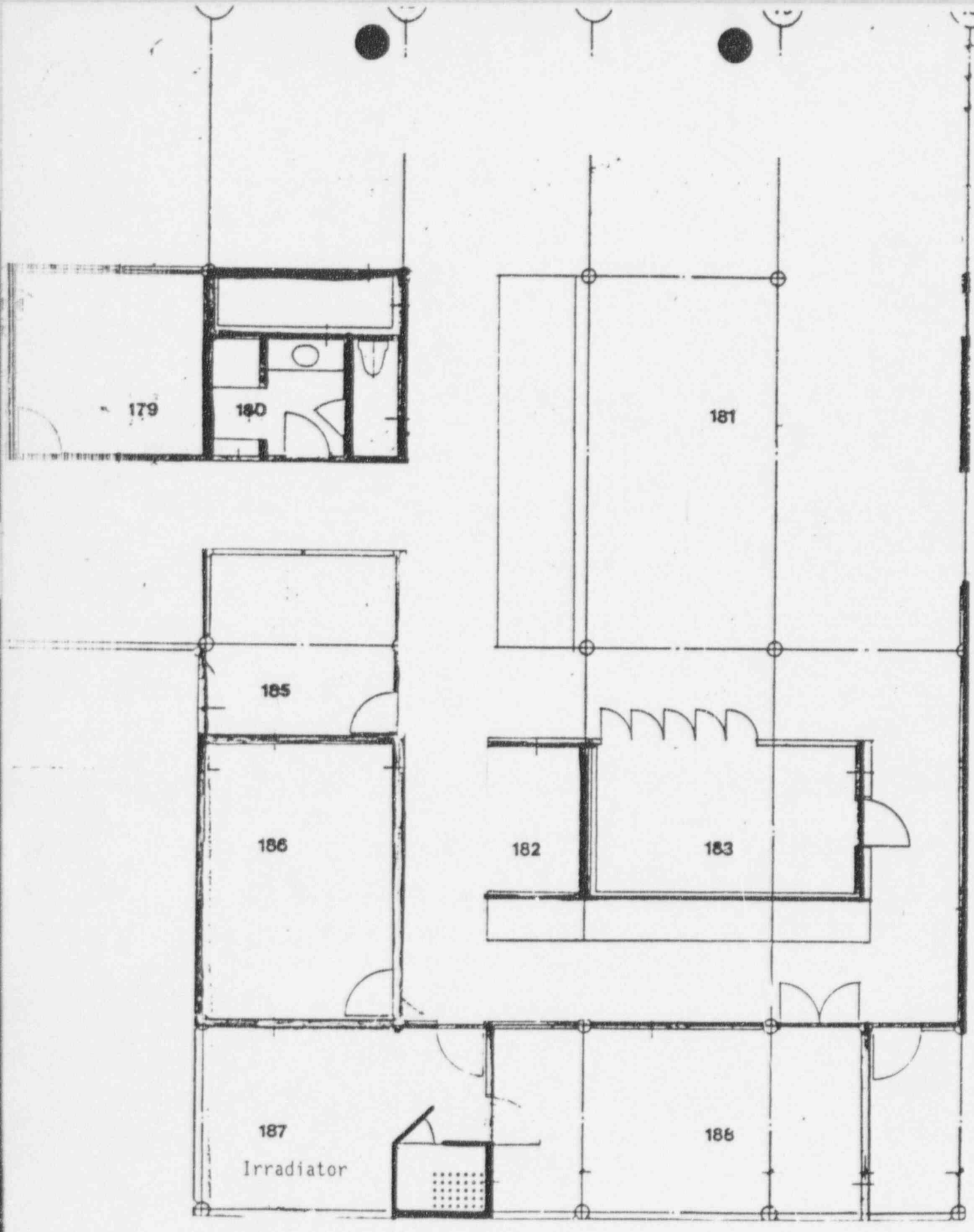
9. Facilities and equipment.

The Irradiation Room

The irradiation room is located in the product management department in room no. 187 (see copy of blueprints enclosed herewith). The irradiation room contains of a 4.5' x 6' steel cage which houses the irradiator and is labeled in accordance with 10 CFR 20.1902. Only trained personnel will have access to the irradiator and the cage will be secured against unauthorized entry at all times. The keys to the cage and to operate the irradiator will be available from the Assistant Director of Product Management or the Director of Product Management.

The irradiation room is equipped with an automatically operated fire detection and control system (automatic sprinklers) that is adequate to assure the integrity of the irradiator and source in a fire. Additionally a J.L. Shepherd & Associates Model 145-45A irradiator meets requirements for a standard industrial fire without releasing radiation or radioactive materials to the environs.

A diagram of the irradiation room is enclosed herewith.



IRRADIATION ROOM

From: Pg A3 First floor plan - South

ITEM 9

Laboratory Facilities for Unsealed Radionuclide Use

Radiation Handling Equipment

To enable personnel to work safely with unsealed radioactive materials, the laboratory will have the proper radiation handling equipment. The following is a list of basic radiation handling equipment which is available in the laboratory:

- Lead vial and container shields.
- Waste receptacles.
- Laboratory coats or equivalent.
- Absorbent pads.
- Disposable gloves.
- Decontaminating agents.
- Signs and labels indicating the presence of radioactive material(s).

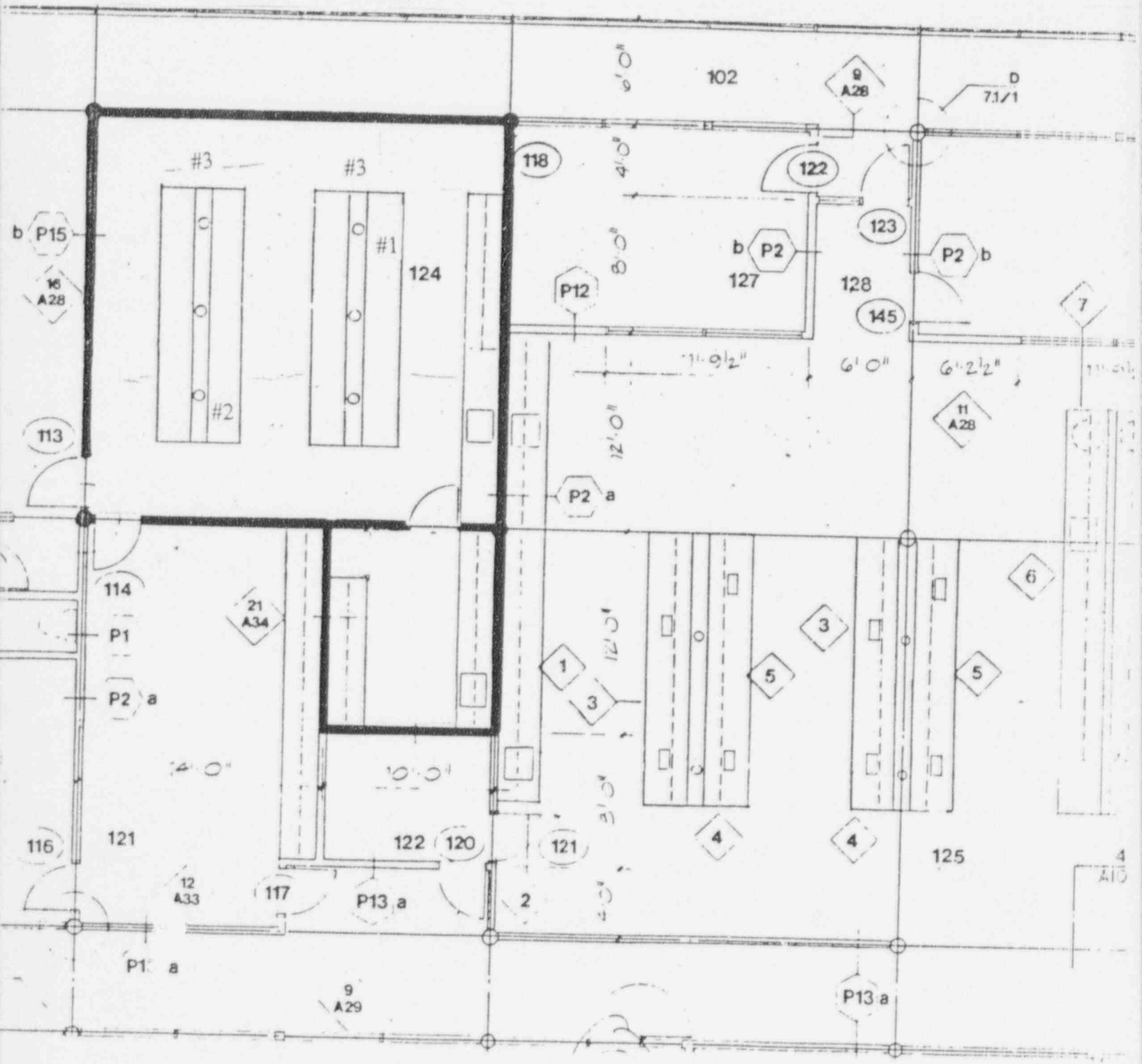
Beyond these generic materials specific detection instrumentation (described in item 10) is available.

Diagrams of the laboratories containing radioactive materials are enclosed herewith.

HLA "DNA" Laboratory

From Pg. A2 First floor plan - North

#1 = Work Area; #2 = Storage Area; #3 = Waste Storage Area



ITEM 9

American Red Cross

Blood Services, Badger-Hawkeye Region
Madison Location
4860 Sheboygan Avenue, P.O. Box 5905
Madison, Wisconsin 53705-0905
(608) 233-9300
FAX (608) 233-8318

FOREWORD

Ionizing radiation is among the most versatile and useful tools of modern medicine and biomedical research. Like many other instrumentalities of medicine, ionizing radiation is potentially hazardous unless used with strict adherence to safety rules and procedures. Thus, the safety rules which govern the uses of radiation are concerned with preventing genetic damage as well as with protecting the health of the exposed individual.

The rules and procedures set forth here have one single, straightforward purpose: to protect the employees and visitors from unnecessary and/or potentially harmful radiation.

The existing radiation safety program has many facets designed to keep the levels of exposure to personnel at a minimum. The program has three main phases:

PHASE I

Achieve the objective of maintaining the radiation exposure to "As Low as Reasonably Achievable" (ALARA) to employees and visitors.

PHASE II

Control operational procedures by the user of radiation sources.

PHASE III

Evaluation of the radiation safety program performed by the Radiation Safety Officer, health physics consultant, and the Radiation Safety Committee.

We, the management of the American Red Cross Badger-Hawkeye Region Blood Services, are committed to the program procedures and to develop new procedures as appropriate to implement the ALARA concept.

Gary A. Becker, M.D. - Principal Officer

4-17-95

Date

RADIATION SAFETY PROGRAM (ALARA)

I. INTRODUCTION

A. Purpose

This program sets forth the philosophy and general management policies that are established by this facility to achieve the objective of maintaining radiation exposures to "as low as reasonably achievable" (ALARA), for employees and visitors.

B. Policy

In addition to complying with the limits set forth in pertinent regulations, guides, and standards, users and supervisors of radiation sources shall make every reasonable effort to maintain radiation exposures as low as reasonably achievable.

II. MANAGEMENT COMMITMENT

A. The management and the entire staff of this facility are committed to the program described herein for keeping radiation exposures, individual and collective, to as low as reasonably achievable.

B. We will perform a formal annual review of the radiation safety program including ALARA considerations. This shall include reviews of operating procedures and past exposure records, inspections, etc., and consultations with the radiation protection staff or outside consultants.

C. Modification to operating and maintenance procedures and to equipment and facilities will be made where they will reduce exposures unless the cost, in our judgment, is considered to be unjustified. We will be able to demonstrate, if necessary, that improvements have been sought, that modifications have been considered, and that they have been implemented where reasonable. Where modifications have been recommended but not implemented, we will be prepared to describe the reasons for not implementing them.

D. In addition to maintaining doses to individuals as far below the limits as is reasonably achievable, the sum of the doses received by all exposed individuals will also be maintained at the low practicable level. It would not be desirable, for example, to hold the highest doses to individuals to some fraction of the applicable limit if this involved exposing additional people and significantly increasing the sum of radiation doses received by all involved individuals.

E. The services of Paul DeLuca, Ph.D., Health Physics Consultant has been contracted to assist in the program management to insure that all pertinent employees receive appropriate

briefings and training in radiation safety including ALARA concepts.

III. RADIATION SAFETY OFFICER, AND HIS CONSULTANT STAFF ARE RESPONSIBLE FOR THE FOLLOWING:

A. Annual and Quarterly Review

1. Annual review of the Radiation Safety Program. The RSO will assure that the Radiation Safety Committee meets and performs an annual review of the Radiation Safety Program for adherence to ALARA concepts. Reviews of specific procedures may be conducted on a more frequent basis. The Radiation Safety Committee consists of: Paul DeLuca, Ph.D., Health Physics Consultant, Gary A. Becker, M.D., Principal Officer, James Rowe, Radiation Safety Officer, A. J. Hibbard, M.D., Medical Director, George Gaučys, Director, HLA Lab and Linda Yonash, Director, QC-Operations.

2. Quarterly review of Occupational Exposures. The RSO will review at least quarterly the external radiation exposures of authorized users and workers to determine that their exposures are ALARA in accordance with the provisions of paragraph V of this program.

3. Quarterly review of records of Radiation Level Surveys. The RSO will review radiation levels in unrestricted and restricted areas to determine that they were at ALARA levels during the previous quarter.

B. Education Responsibilities for an ALARA Program

1. The RSO will schedule briefings and educational sessions to inform workers of ALARA program efforts.

2. The RSO will assure that authorized users, workers, and ancillary personnel who may be exposed to radiation will be instructed in ALARA philosophy and informed that management, the Radiation Safety Committee and the RSO are committed to implementing the ALARA concept.

C. Cooperative Efforts for Development of ALARA Procedures

Radiation workers will be given opportunities to participate in the formulation of the procedures that they will be required to follow.

1. The RSO will be in close contact with all users and workers in order to develop ALARA procedures for working with radioactive materials.

2. The RSO will establish procedures for receiving and evaluating the suggestion of individual workers for improving health physics practices and encourage the use

of those procedures.

D. Reviewing Instances of Deviation from Good ALARA Practices

The RSO will investigate all known instances of deviation from good ALARA practices and, if possible, determine the causes. When the cause is known, the RSO will require changes in the program to maintain exposures ALARA.

IV. PERSONS WHO RECEIVE OCCUPATIONAL RADIATION EXPOSURE

A. The worker will be instructed in the ALARA concept and its relationship to his working procedures and work conditions.

B. The worker will know what recourses are available if he feels that ALARA is not being promoted on the job.

V. ESTABLISHMENT OF INVESTIGATIONAL LEVELS IN ORDER TO MONITOR INDIVIDUAL OCCUPATIONAL EXTERNAL RADIATION EXPOSURES

This institution hereby establishes Investigational Levels for occupational external radiation exposure which, when exceeded, will initiate review or investigation by the Radiation Safety Officer or consultant staff. The Investigational Levels that we have adopted are listed in Table 1 below. These levels apply to the exposure of individual workers.

TABLE 1

		Investigational Levels (mrems per calendar quarter)	
		LEVEL I	LEVEL II
1.	Whole body; head and trunk; active blood-forming organs; lens of eyes; or gonads	125	375
2.	Hands and forearms; feet and ankles	1,875	5,625
3.	Skin of whole body*	750	2,250

*Not normally applicable to medical facilities except those using significant quantities of beta emitting isotopes.

The Radiation Safety Officer will review the results of personnel monitoring, film badge report, not less than once in any calendar quarter, as is required by 10 CFR 20, 20.2106. The following actions will be taken at the Investigational Levels as stated in Table 1:

A. Quarterly exposure of individual to less than Investigational Level I.

Except when deemed appropriate by the RSO, no further action will be taken in those cases where an individual's exposure is less than Table 1 values for the Investigational Level I.

B. Personnel exposures equal to or greater than Investigational Level I, but less than Investigational Level II.

The RSO will review the exposure of each individual whose quarterly exposures equal or exceed Investigational Level I. If the exposure does not equal or exceed Investigational Level II, no action related specifically to the exposure is required.

C. Exposure equal to or greater than Investigational Level II.

The RSO will investigate in a timely manner the cause(s) of all personnel exposures equaling or exceeding Investigational Level II and, if warranted, take action. The investigation will be documented and made available to NRC inspectors for review at the time of the next inspection.

D. Re-establishment of an individual occupational worker's Investigational Level II above that listed in Table 1.

In cases where a worker's or a group of workers' exposure needs to exceed Investigational Level II, a new, higher Investigational Level II may be established on the basis that it is consistent with good ALARA practices for that individual or group. Justification for a new Investigational Level II will be documented.

VI. SIGNATURE OF CERTIFYING OFFICIAL

I hereby certify that this institution has implemented the ALARA Program set forth above.

Mary A Becker — 4-17-95

Gary A. Becker, Principal Officer — Date

10. Radiation Safety Program.

10.1 Personnel Monitoring Equipment

Personnel monitoring devices:

Dosimeters (film badges or TLDs) will be made available to radiation workers. The supplier (service company) is:

Tech/Ops. Landaur, Inc.
2 Science Road
Glenwood, IL 60425-1586
account no. 87114

Tech/Ops. Landaur, Inc. is accredited by the National Bureau of Standards through the National Voluntary Laboratory Accreditation Program (NVLAP). The exchange frequency is monthly.

Requirements for dosimeter use:

Irradiator

All personnel are required to wear whole body dosimeters whenever they use the irradiator.

Phosphorus-32

All personnel are required to wear whole body dosimeters whenever handling P-32 and an extremity dosimeter also when handling P-32 in millicurie quantities.

Chromium-51

All personnel are required to wear dosimeters (both whole body and extremity).

Hydrogen-3 and Sulphur-35

Dosimeters are not required when handling these materials.

Bioassays

The NRC Guidelines for Bioassay requirements for Tritium are enclosed herewith and will be followed.

GUIDELINES FOR BIOASSAY REQUIREMENTS FOR TRITIUM

Nuclear Regulatory Commission
Division of Fuel Cycle and Material Safety

August 3, 1977

BIOASSAY REQUIREMENTS FOR TRITIUM

I. Conditions Requiring Bioassay

A. Routine Bioassay is required when quantities processed by an individual at any one time, or total amount processed per month, exceed those for the respective forms of tritium as shown in the attached Table 1.

B. Above 0.1 of the levels in Table 1, routine bioassay is required unless a written justification is submitted for not performing bioassays.

C. After protective devices, suits, hoods, or gloves are used to prevent exposure of a worker to concentrations of airborne tritium that would subject an unprotected worker to an intake of 6.3 mCi in one calendar quarter, bioassay is required.

D. Bioassay is not required for process quantities less than 0.1 of those in Table 1.

II. Who Should Participate

All workers involved in the processing of tritium, under conditions specified in I.A or I.B above, or sufficiently close that intake is possible, should participate.

III. What Types of Bioassays Should be Performed

A. Baseline, Pre-employment, or Pre-operational Urinalysis (not more than one month prior to beginning work with tritium requiring bioassay under Section I. above).

B. Routine Urinalysis.

C. Post-operational. Within one month of last possible exposure to tritium.

D. Diagnostic. Within one week of any sample exceeding levels given as action points in Section V. below. See V.2.(d).

IV. How Often

A. Initial Routine Samples

Within 48 hours following entry of an individual into an area where operations require bioassay according to Section I. A. and B. above, and then every two weeks or more frequently thereafter as long as the individual is working with ^{3}H.

B. After 3 Months

The sampling frequency selected in accordance with Section IV.A above may be changed to quarterly if, after 3 months, the following 3 conditions are met:

(1) The average urinary tritium concentration from specimens obtained during the 3-month period does not exceed 3 μCi/l, and

(2) The average concentration of tritium in air (μCi/ml), multiplied by the factor 6.3×10^{8} ml, does not exceed 0.8 mCi; if the time (t hours/week) of exposure is not equal to 40 hours/week, the 0.8-mCi criterion may be adjusted by the factor 40/t;

(3) The working conditions during the 3-month period, with respect to the potential for tritium exposure, are representative of

working conditions during the period in which a quarterly urinalysis frequency is employed, and there is no reasonable expectation that the criteria given in (1) and (2) above will be exceeded.

V. Action Points and Corresponding Actions

A. Bi-Weekly or More Frequent Sampling

1. If urinary excretion rates exceed 5 μCi/liter, but are less than 50 μCi/liter, the following course of action should be taken:

(a) a survey of the operations involved, including air and area monitoring, should be carried out to determine the cause(s) of exposure and evaluate potential for further larger exposures.

(b) Implement any reasonable corrective actions indicated in the survey that may lower the potential for further exposures.

(c) A repeat urine sample should be taken within one week of the previous sample and should be evaluted within a week after collection.

(d) Any evidence from (a) or (b) indicating that further work in the area might result in an employee receiving a dose commitment in excess of the limits established in §20.101 for whole-body exposure should serve as cause to remove the

employee from work in this operation until the source of exposure is discovered and corrected.

2. If urinary excretion rates exceed 50 µCi/liter, the following course of action should be taken:

   (a) Carry out all steps as in 1.(a) to (d) above.

   (b) If the projected body water dose commitment exceeds 5 rems, report the incident to the NRC in accordance with §20.403 of 10 CFR Part 20.

   (c) Refer the case to appropriate medical/health physics consultation for recommendations regarding therapeutic procedures which may be carried out to accelerate removal of tritium from the body and reduce the dose to ALARA levels.

   (d) Carry out repeated sampling (urine collections of at least 100 ml each) at approximately one-week intervals, at least until samples show an excretion rate less than 5 µCi/liter. If there is a possibility of long-term organic compartments of tritium that require evaluation, continue sampling as long as necessary to ensure that appreciable exposures to these other compartments do not go undetected.

   (e) Provide, as a condition of the license, that written reports on any therapy, and dose commitment estimates prior to and following therapy, be provided to NRC. These reports should contain a description of the

processes and quantities of tritium involved that led to the exposure.

B. Quarterly Samoling

Carry out actions at levels as indicated under A. above, and, if the excretion rate continues to exceed 5 µCi/liter, also reinstitute biweekly (or more frequent) sampling for at least the next 6-month period, even when urinary excretion falls below 5 µCi/liter.

TYPES OF OPERATION	HTO FORM	HT or T_2 GAS IN SEALED PROCESS VESSELS	NUCLEOTIDE PRECURSORS	HTO MIXED WITH MORE THAN 10K_g OF INERT H_2O OR OTHER SUBSTANCES
PROCESSES IN OPEN ROOM OR BENCH, WITH POSSIBLE ESCAPE OF TRITIUM FROM PROCESS VESSELS	0.1 Ci	100 Ci	0.01 Ci	0.01 Ci/K_g
PROCESSES WITH POSSIBLE ESCAPE OF TRITIUM, CARRIED OUT WITHIN A FUME HOOD OF ADEQUATE DESIGN, FACE VELOCITY, AND PERFORMANCE RELIABILITY	1 Ci	1000 Ci	0.1 Ci	0.1 Ci/K_g
PROCESSES CARRIED OUT WITHIN GLOVEBOXES, ORDINARILY CLOSED, BUT WITH POSSIBLE RELEASE OF TRITIUM FROM PROCESS LEVELS AND OCCASIONAL EXPOSURE TO CONTAMINATED BOX AND BOX LEAKAGE	10 Ci	10,000 Ci	1 Ci	1 Ci/K_g

Table 1

ACTIVITY LEVELS OR CONCENTRATIONS ABOVE WHICH BIOASSAY SHALL BE REQUIRED

Quantities present (< 10Kg) may be considered either the amount processed by an individual at any one time (when accidental intake is more likely), or the amount of activity entered into process (throughput) during any one month (when routine handling of repeated batches is the more likely source of exposure). Concentrations in the right-hand column may be used when activity in process is always diluted in more than 10K_g of other reagents, as in nuclear reactor coolant systems.

10.2 Radiation Detection Instruments

The following instrumentation or instrumentation having physically similar characteristics will be used:

Instrument	Radiation	Sensitivity	Window	Use
(2) Eberline E-120 HP-190 probe	β, gamma	0-50 mR/hr	1.4-2mg/cm^2	monitoring
(1) LKB 1211-411	β	55% w/^{3}H	N/A	measuring monitoring

Calibration of Survey Meter Instrumentation

Survey meter calibrations will be conducted at intervals not to exceed twelve (12) months by the University of Wisconsin Radiation Calibration Service - Department of Medical Physics. Calibrations will be conducted using sealed Cesium-137 sources of approximately 130 curies and 1.3 curies under License Number 48-09843-18. Instruments will be calibrated so that readings are within $\pm$ 20% of the actual values over the range of the instrument. Calibration records will be kept for a minimum of 2 years after each calibration.

Detector devices such as liquid scintillation or gamma detectors will be calibrated in accordance with manufacturer's instructions.

10.3 Survey Program

Irradiator Leak Testing

The RSO will be responsible for insuring that leak tests are performed. To insure the integrity of the sealed source, tests will be performed at intervals not to exceed six months. Test samples will be taken from appropriate accessible surfaces. Leak tests of the irradiator will be performed by the Radiation Safety Officer or designee utilizing Siemens Gammasonics, Inc. Q1 Teak Testing Kit for Sealed Source Radioactive Sources. Leak tests will be analyzed by:

Siemens Gammasonics, Inc.
Health Physics Services
2501 Barrington Road
Hoffman Estates, IL 60195-7372

License No. 12-00369-01

Exterior surfaces of the port and the inner surface of the irradiator chamber shall be wiped with an absorbent paper. This shall be an area not to exceed 100 square cm. The results of the leak test shall be recorded in microcuries of removable contamination.

In the event of finding removable contamination in excess of 0.05 microcuries, the unit shall not be used until appropriate corrective action is taken.

Laboratory areas survey procedures

1. Laboratory surveys will be conducted by the Radiation Safety Officer or his designee, in each area where radioactive material is used or stored and will consist of:

   a. A measurement of radiation levels with a survey meter sufficiently sensitive to detect 0.1 mRem per hour.

   b. A series of wipe tests to measure contamination levels. The method for performing the wipe tests will be sufficiently sensitive to detect 200 dpm per 100 sq. cm. for the contamination involved.

2. Survey frequency

   a. Surveys for hydrogen-3 will be performed monthly when H-3 has been in use and quarterly when it has not.

   b. Surveys for phosphorus-32 will be performed weekly when it has been in use and monthly when it has not.

   c. Surveys for chromium-51 will be performed weekly when it has been in use and monthly when it has not.

   d. Surveys for sulphur-35 will be performed weekly when it has been in use and monthly when it has not.

3. A permanent record will be kept of all survey results, including negative results. The record will include:

   a. Location and date

   b. Name of person conducting the survey

   c. Measured exposure rates, keyed to locations (point out rates that require corrective action).

   d. Detected contamination levels, keyed to location.

   e. Corrective action taken in the case of contamination or excessive exposure rates, reduced contamination levels or exposure rates after corrective action, and any appropriate comments.

The area will be cleaned if the contamination level exceeds 200 dpm per 100 sq. cm.

10.4 Operating and Emergency Procedures

Irradiator

The operating procedures for the irradiator will be: (a) provided to each person who uses the irradiator and (b) maintained at the control station. Topics covered in the operating procedures include:

1. Step-by-step procedures for operation of the irradiator.

2. Determination and recording of radiation doses to irradiator operators.

3. Methods to insure that only authorized persons will use the irradiator.

4. Inspections, test procedures, and maintenance to insure that all safety interlocks, devices, and components associated with the irradiator are functioning properly.

5. Emergency Procedures.

GENERAL RULES FOR THE SAFE USE OF RADIOACTIVE MATERIAL

1. Laboratory coats and other protective clothing will be worn at all times in areas where radioactive materials are used.

2. Disposable gloves will be worn at all times while handling radioactive materials.

3. Hands and clothing will be monitored for contamination at the end of each working day.

4. There will be no eating, drinking, smoking or the application of cosmetics in any area where radioactive material is stored or used.

5. Personnel monitoring devices (film badge or TLD) will be worn at all times while in areas where radioactive materials are used or stored.*

6. Radioactive waste will be disposed of only in specially designated receptacles.

7. There will be no pipetting by mouth.

8. Radioactive solutions will be confined in covered containers, plainly identified and labeled with name of compound, radionuclide, date, activity, and radiation level, if applicable.

9. Radioactive material will always be transported and maintained in shielded containers.

10. The hot lab will have restricted access when personnel are not present.

11. Emergency notification home telephone numbers will be posted on the door.

12. There will be no storage of food, drink, of personal effects with radioactive material.

13. General rules for handling Phosphorus-32

    a. Low density shielding will be used whenever possible.
    b. Tongs will be used whenever possible.
    c. A suitable survey meter will be kept in the close proximity and frequent surveys will be performed.
    d. Finger badger will be worn when handling millicurie quantities of P-32.
    e. "Dry runs" will be performed with unfamiliar procedures.
    f. Eye protection will be worn when handling millicurie quantities of P-32.

*Personnel monitoring devices will be stored in a designated low background area when not being worn. Personnel monitoring devices are not required when handling tritium or Sulphur-35.

PROCEDURES FOR ORDERING AND RECEIVING RADIOACTIVE MATERIAL

1. The supervising technologist or his designee will place all orders for radioactive material, will ensure that the requested materials and quantities are authorized by the license, and that possession limits are not exceeded.

2. During normal working hours, carriers will be instructed to deliver packages containing radioactive material directly to the laboratory.

3. There will be no radioactive material packages accepted after normal working hours.

4. A system for ordering and receiving radioactive materials will be established and maintained. The system will consist minimally of the following:

   a. Written records that identify the radionuclide, compound, activity levels, supplier, etc., will be used.

   b. The written records will be referenced when opening or storing radioactive shipments.

PROCEDURES FOR SAFELY OPENING PACKAGES CONTAINING RADIOACTIVE MATERIAL

For safely opening packages containing radioactive material, the worker will:

1. Put on gloves to prevent hand contamination.

2. Visually inspect packages for any sign of damage (wetness, crushed, etc.). If damage is noted, the procedure will be stopped and the radiation safety officer notified.

3. Measure exposure rate at three feet from package surface and record. If greater than 10 mR per hour, the procedure will be stopped and the radiation safety officer notified.

4. Measure surface exposure rate and record. If greater than 200 mR per hour, the procedure will be stopped and the radiation safety officer notified.

5. Wipe external surface of shipping container and remove wipe to low background area. Assay the wipe and record amount of removable radioactivity (e.g., dpm/100 sq. cm., etc.). Check wipes with a thin end window GM survey meter. The procedure will be stopped if removable contamination is greater than 22,000 dpm/100 sq. cm. above background. The radiation safety officer and health physics consultant shall be notified to determine the "exempt" status of the package with respect to wipe testing. If the package is not exempt, then appropriate notification of regulatory officer will be made.

6. Open the package with the following precautionary steps:
   a. Open the outer package following manufacturer's instructions, if supplied, and remove packing slip.
   b. Open inner package and verify that contents agree with those on packing slip. Compare requisition, packing slip, and bottle label.
   c. Check integrity of final source container, (inspect for breakage of seals or vials, loss of liquid, discoloration of packaging material).
   d. Check also that shipment does not exceed possession limits.

7. Wipe external surface of final source container and remove wipe to low background area. Assay the wipe and record amount of removable radioactivity (e.g., dpm/100 cu. cm., etc.). Check wipes with a well counter/scintillation detector or thin end window GM survey meter, and take precautions against the spread of contamination as necessary. The acceptable level of removable contamination will be 200 dpm/100 sq. cm. above background. The procedure will be stopped and the radiation safety officer notified if this level is exceeded.

8. Monitor the packing material and packages for contamination before discarding. If contaminated, treat as radioactive waste. If not radiation labels will be obliterated before discarding in regular trash.

Records will be maintained of the results of checking each package (see following sample).

LABORATORY EMERGENCY PROCEDURES

Minor Spills

1. All persons in the area will be notified when a spill has occurred.

2. The spill will be covered with absorbent paper to prevent its spread.

3. Disposable gloves and remote handling tongs will be used to clean up the spill. The absorbent paper and pad will be carefully folded, inserted into a plastic bag and disposed of in the radioactive waste container. All other contaminated materials such as disposable gloves will also be inserted into the plastic bag.

4. The survey will be conducted using a low-range, G-M survey meter. The area around the spill, hands, and clothing will be checked for contamination.

5. The incident will be reported to the radiation safety officer.

Major Spills

1. All persons not involved in the spill will be notified to vacate the room.

2. The spill will be covered with absorbent pads, but no attempt to clean it up will be made. The movement of all personnel potentially contaminated will be confined to prevent the spread.

3. Shield the spill if possible, but only if it can be done without further contamination or without significantly increasing your radiation exposure.

4. The room will be vacated, and the door(s) locked to prevent entry.

5. The radiation safety officer will be notified immediately.

6. Contaminated clothing will be removed and stored for further evaluation by the radiation safety officer. If the spill is on the skin, the area will be flushed thoroughly and washed with mild soap and lukewarm water.

EMERGENCY CONTACTS:

CONTACT:	POSITION	IN-HOUSE	EXTERNAL Phone #
James Rowe, Director - Customer Service	Radiation Safety Officer	ext. 202	608-233-9497
George Gaučys, Supervisor- HLA	Licensed User	ext. 239	608-255-6315
Gary Becker, M.D., Principle Officer	Licensed User	ext. 305	608-271-0814
A. J. Hibbard, M.D., Medical Director	Licensed User	ext. 307	608-873-0689
Paul DeLuca, Ph.D., Health Physics Consultant	Licensed User		608-262-0026 off. 608-274-1842 hm.
J.L. Shepherd & Ass.	Irradiator Manufacturer		818-898-2361
Nuclear Regulatory Commission	Regulatory Agency		708-829-9500

10.5 Plans for Irradiator Installation, Relocation, Removal and Maintenance

Initial installation, relocation, removal and all maintenance involving removal of shielding or access to the source shall be performed by the manufacturer of the irradiator or a properly U.S. Nuclear Regulatory Commission licensed firm. This shall include transportation, rigging and source loading if required.

11. Waste management.

Cs-137 Sealed Source Irradiator

All servicing, repair and replacement of sealed sources will be performed by J.L. Shepherd & Ass. or a properly licensed firm. J.L. Shepherd & Ass. or a properly licensed firm are responsible for the disposal of the sealed source.

Unsealed Radionuclides

Adequate lead or other suitable shielding will be provided as necessary to reduce the radiation exposure levels to the lowest reasonable level while the radioactive waste is in temporary storage.

Liquid radioactive waste will be segregated by radionuclide.

Chromium, Phosphorus and Sulphur Waste:

All liquid, radioactive waste will be either: 1.) held for decay until radiation levels, as measured in a low background area with a low-level survey meter and with all shielding removed, have reached background levels. Once this has been achieved, all radiation labels will be removed of obliterated and the waste will be disposed in the normal trash. or 2.) disposed of in the sanitary sewage system in accordance with 10 CFR, Part 20.2003 Code of Federal Regulations. Appropriate documentation will be maintained.

Tritium

All liquid, radioactive waste will be disposed of in the sanitary sewage system in accordance with 10 CFR, Part 20.2003 Code of Federal Regulations. Appropriate documentation will be maintained.

Solid waste will be segregated by radionuclide.

Chromium, Phosphorus and Sulphur Waste.

All solid, radioactive waste will be held for decay until radiation levels, as measured in a low background area with a low-level survey meter and with all shielding removed, have reached background levels. Once this has been achieved, all radiation labels will be removed of obliterated and the waste will be disposed in the normal trash. Appropriate documentation will be maintained.

Tritium

Solid waste will be disposed in accordance with 10 CFR, Part 20.2005, Code of federal Regulations, or transferred to an authorized recipient for disposal in accordance with 10 CFR, Part 20.2006, Code of federal Regulations.

Records are maintained for each of the described disposal methods. Such records include date of storage, amount of radioactivity, radionuclides, date of disposal, disposition of materials and the initials of the disposing individual.

FEB 0 4 1997

George Gaucys
American Red Cross
Badger Regional Blood Center
4860 Sheboygan Avenue
P. O. Box 5905
Madison, WI 53705

Dear Mr. Gaucys:

Enclosed is Amendment No. 05 renewing your NRC Material License No. 48-15423-02 in accordance with your request.

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 III office at (630) 829-9887 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. Unless your license has been 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 the Radiation Safety Officer permanently discontinues performance of duties under the license or has a name change; or

   b. When the licensee's mailing address changes (no fee is required if the location of byproduct material remains the same).

398476

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.

4. Request and obtain a license amendment before you:

   a. Change Radiation Safety Officers;

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

   c. Add or change the areas of use or address or addresses of use identified in the license application or on the license; or

   d. 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 certifying official rather than a consultant.

You will be periodically inspected by 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 Policy and Procedures for NRC Enforcement Actions. 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.

Sincerely,

Original Signed By
Evelyn R. Matson
Nuclear Materials Licensing Branch

License No. 48-15423-02
Docket No. 030-18608

Enclosure: Amendment No. 05

DOCUMENT NAME: M:\03018608.CL7
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OFFICE	DNMS/RIII									
NAME	ERMatson:brt									
DATE	01/3/97									

OFFICIAL RECORD COPY

UNITED STATES NUCLEAR REGULATORY COMMISSION
REGION III
CONVERSATION RECORD

(X) TELEPHONE (X) OUTGOING ( ) INCOMING ( ) CONVERSATION TIME: 4pm DATE: 1/29/97

NAME OF PERSON(S) CONTACTED: ORGANIZATION: TELEPHONE NO.:
James Rowe
American Red Cross

SUBJECT:
Renewal of License No. 48-15423-02

SUMMARY:

Mr. Rowe stated that all radionuclides other than the irradiator are now offsite. He stated that close-out surveys of the rooms were performed years ago and the records are not available any longer. He stated that for the H-3 surveys, they were done with a liquid scintillation counter and the results were all at background level.

Given the information available and the low level quantities and risk of the materials used, the labs can be released for unrestricted use.

ACTION REQUIRED:
Issue the renewal.

ACTION TAKEN:

NAME OF PERSON DOCUMENTING CONVERSATION
Evelyn R. Matson
630-829-9822

SIGNATURE

DATE
1/29/97

April 27, 1995

American Red Cross
Badger-Hawkeye Regional Blood
Center
ATTN: James R. Rowe
Radiation Safety Officer
4860 Sheboygan Avenue
P.O. Box 5905
Madison, WI 53705

SUBJECT: LICENSE RENEWAL APPLICATION

Dear Mr. Rowe:

This is to acknowledge receipt of your application for renewal of the 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 and your license number.

Sincerely,

Original Signed By
Marianne Meenan, Chief
Nuclear Materials Support Section

License No.: 48-15423-02
Control No.: 398476

DOCUMENT NAME: M:\03018608.DT5
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OFFICE	DRSS/RIII	N							
NAME	MMEENAN:jaw mm								
DATE	04/27/95								

OFFICIAL RECORD COPY

CMD: _____

MILESTONE 970206

MAIL CONTROL NO: 396604 DOCKET NO: 03003466 LICENSE NO: 48-10219-01__

NAME: ST. ELIZABETH HOSPITAL_____ ACTION TYPE: 3

MILESTONE	MILESTONE DATE	NON-FEE: MILESTONE	REVIEWER	MILESTONE DATE	TICKLER DATE
01	940309	10	S6	940411	0
02	940309	12	S6	940411	0
03	940314	13	S6	940411	0
04	940322	13	S5	941116	0
07	940405	14	S5	950714	950818
		16	S5	950804	0
		13	S5	960122	0

003 000

vm2.nrc.gov 14:58:46

American Red Cross

Blood Services

Badger-Hawkeye Region
Madison Location
4860 Sheboygan Avenue, PO Box 5905
Madison WI 53705-0905
(608) 233-9300
FAX (608) 233-8318
1-800-GIVE LIFE

July 16, 1996

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

RE: Control # 398-476 Changes Renewal Application for License # 48-15423-02

Dear Colleen,

As we discussed on the telephone we would like to alter our license application which was submitted April 27, 1995. We would like to delete all portions applicable to the following radionuclides: H-3, P-32, S-35 and Cr-51 (all 3M category materials). This would leave only our Cs-137 sealed source irradiator. We would also like to effect a personnel change in Radiation Safety Officer.

Changes in Radionuclides:

The reason for deleting these category 3M materials from our license is discontinued need combined with the desire to limit our annual fees. All references in our license application to these materials should be disregarded. The status of each radionuclide at our facility is addressed separately below.

H-3 No H-3 has been used in this facility since July 1990. Limited material (2.994 mCi) was in storage until 10/14/91 and since that date no material has been on site. A close-out survey was performed and determined to be acceptable - see attached Quarterly Review. Additionally these activities were reviewed in an NRC inspection on 04-28-95 performed by B.J. Holt & Michael LaFranzo. In the license renewal application dated 04/27/95 the areas which had been used for H-3 have been removed from the facility detail.

PM; 7-15-96

RECEIVED JUL 08 1996
JUL 18 1996
REGION III

P-32 P-32 use in our facility has been minimal for the last few years. Typical shipments were 250 microcuries, total quantity shipped in 1995 was 1,750 microcuries. The last P-32 shipment to this facility was 250 microcuries received on 02/23/96. Activity on hand when the final shipment was received was 24 microcuries giving a total of 274 microcuries. All materials have been placed in storage in ½" thick walled leucite containers according to our license requirements. After 143 days from receipt (ten half-lives) all material in storage was surveyed and found to be at background levels, all radioactive warnings were defaced and all material was disposed as normal waste. A close-out survey comprised of wipe testing was completed and all areas were found to be at background. These activities were completed yesterday, 07/15/96 and documentation is attached. The facility will be released for general use on September 1, 1996.

S-35 Although we have been licensed for S-35 we have never received a shipment of this material.

Cr-51 We have only received one shipment of one mCi of Cr-51. That shipment was received on 01-06-87. The material was determined to have decayed to background levels and was disposed on 09/01/87. A close-out survey was performed and determined to be acceptable - see attached Quarterly Review. These activities were reviewed in a NRC inspection performed by William Reichhold on 01/27/88. In the license renewal application dated 04/27/95 the areas which had been used for Cr-51 (identical to those used for H-3) have been removed from the facility detail.

Changing Radiation Safety Officer:

Beginning June 3, 1996 James Rowe assumed the position of Quality Assurance Officer and as such is an American Red Cross National Sector employee and not an employee of the Badger-Hawkeye Region in Madison. An integral requirement of this position is that he not be directly involved with operational activities in the region. Since radiation safety is an operational activity the need to appoint a new Radiation Safety Officer has arisen. Auditing various regional functions including the radiation safety program, irradiator operations, etc. are a part of the QA function and as such Mr. Rowe will continue to monitor functions associated with the radiation program. Additionally Mr. Rowe will be officially available for consultation by the new RSO (in a mentor role) until June 30 1997.

The region's choice for a new Radiation Safety Officer is George Gaučys. George is the Laboratory Manager of the HLA laboratory. He has been fully trained in all irradiator and radiation safety SOPs. George was added to the license as an authorized user in 1992

primarily as succession planning for the RSO position. In January 1993 our license was amended to authorize George (as well as Gary A. Becker, M.D. and A. J. Hibbard, M.D.) to supervise the use of the irradiator. Since that time he has observed the full spectrum of the RSO's responsibilities including all record keeping, staff training, maintenance & repair of the irradiator, etc. We are confident that George's knowledge and experience in combination with his high degree of personal integrity will serve the region well.

If there are any questions with this application or our program please contact one of us.

Sincerely,

James Rowe
Quality Assurance Officer
Radiation Safety Officer

George Gaučys
HLA Laboratory Manager

QUARTERLY REVIEW FOR RADIOACTIVE MATERIALS

FOR H-3

Date: Jan 02, 1992

Period covering 10/1/91 to 12/31/91

Shipments:

1. Total shipments received during quarter . . . . . Ø
2. Total activity received during quarter . . . . . Ø
3. Largest quantity on hand at any one time . . . . . 2994 μCi

Waste disposal:

1. Activity disposed as liquid waste in period . . . . . 2994 μCi
2. Activity disposed as solid waste in period . . . . . Ø
3. Total activity disposed during period . . . . . 2994 μCi

Surveys:

1. Surveys performed according to regulations Yes

General comments: No H^3 in use since 7/27/90. No more H^3 on site. Regular wipe tests no longer necessary

Completed by [signature]

revised 01/92

QUARTERLY REVIEW FOR RADIOACTIVE MATERIALS
for
Cr-51

Date Oct 1, 1987

Period covering 7/3/87 to 10/1/87

Shipments:

1. Total shipments received during quarter - - - - Ø
2. Total activity received during quarter - - - - Ø
3. Largest quantity on hand at any one time - - - ~ 12.5 μC

Decay:

1. Activity decayed during the quarter - - - - - - ~ 12.5 μC.

Surveys:

1. Surveys performed according to regulations - - ✓
2. Comments decayed to background by 9/1/87 discontinued surveys

General comments:

Completed by J. R. Rowe

revised 9/87

32-P WASTE BIN RECORD

BADGER-HAWKEYE RED CROSS
DNA LABORATORY

WASTE BIN # 5

PUT INTO USE BY [signature] DATE 7-25-95

SEALED BY [signature] DATE 3-14-96

EARLIEST DATE FOR DISPOSAL* (6-14-96) 7/15/96

date calculated based on last SZP shipment rather than date bin sealed

CONTENTS SCANNED AND DISPOSED OF BY [signature] * DATE 7-15-96

RESULT OF SCAN all Background

EMPTY BIN INSPECTED, SCANNED AND CLEANED BY [signature] DATE 7-15-96

Disposal of Materials: Wait a minimum of 5 months (10 half-lives of 32-P=142 days) past the date the container was sealed before attempting to dispose of the contaminated materials. Scan all materials with a survey meter to ensure activity has dropped to background levels. Remove or deface all 'radioactive warning' tapes and labels from all waste materials before disposal. Solids may be discarded in the biohazardous waste containers. Liquids may be poured down the sink, with the tap running freely, and the holding containers rinsed and put into the storage box for re-use.
The large storage bins should be cleaned with an appropriate detergent, if necessary, and allowed to dry. Remove or deface all 'radioactive warning' tapes and labels from the bins. Perform a final scan of the empty bin.

Reviewed & Approved 7-15-96 [signature] RSO

FINAL WIPE TESTS FOR DNA (RFLP) LABORATORY

Conducted 7-15-96
By

GM survey meter response check dc (Sr 90)

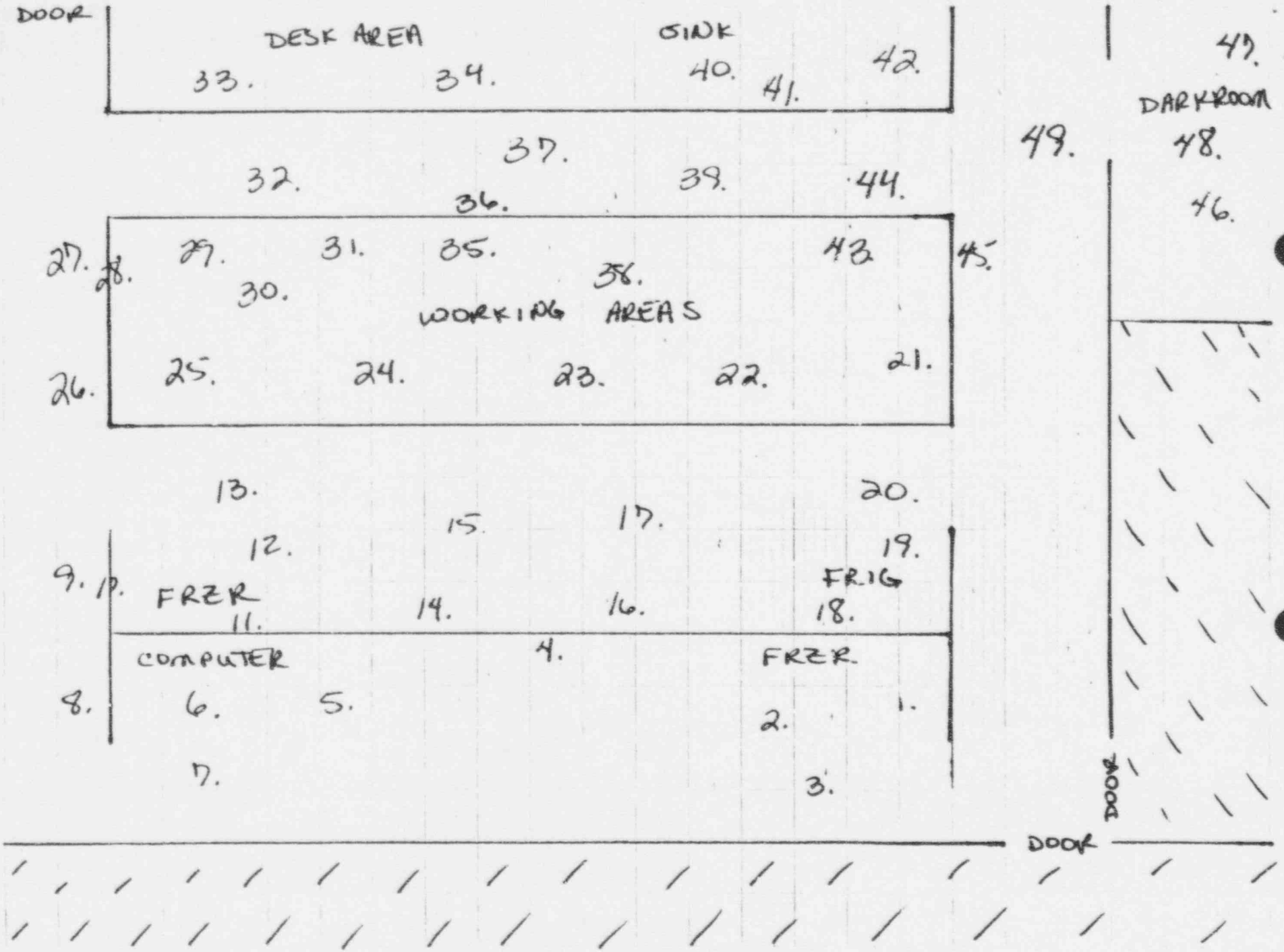
Survey meter results of areas all Background

Corrective action taken none taken

* 1. old freezer, outer		3.0		11. freezer, outer		5.0	
2. old freezer, inner		6.0		12. freezer, inner		5.0	
3. floor		7.0		13. floor		5.0	
4. island counter		7.0		14. beta counter		3.0	
5. digitizer		6.0		15. floor		4.0	
6. counter		7.0		16. file cabinet		6.0	
7. floor		5.0		17. oven		6.0	
8. waste bin		8.0		18. frig, outer		3.0	
9. waste bin		6.0		19. frig, inner		12.0	
10. shelf		8.0		20. floor		3.0	
21. counter		8.0		31. counter		8.0	
22. counter		3.0		32. floor		6.0	
23. counter		6.0		33. desk counter		5.0	
24. island counter		4.0		34. rocker		10.0	
25. shield on counter		7.0		35. waste bin		10.0	
26. waste bin		8.0		36. waste bin		[illegible]	
27. waste bin		8.0		37. floor		[illegible]	
28. shelf		8.0		38. sealer		[illegible]	
29. counter		4.0		39. floor		[illegible]	
30. centrifuge		4.0		40. sink, inner		[illegible]	
41. sink, rim		5.0					
42. incubator		7.0					
43. pH meter area		9.0					
44. floor		7.0					
45. shelf		4.0					
46. darkroom counter		9.0					
47. darkroom sink		5.0					
48. darkroom floor		4.0					
49. floor		3.0					
50. background		6.0					

Reviewed & Approved
07-15-96
R. Pond, RSO

* See map



Map for Final Survey D-15-96

DIVISION OF ACCOUNTING AND FINANCE
REQUEST FOR REFUND TO EMPLOYEE/VENDOR

THE EMPLOYEE/VENDOR IDENTIFIED BELOW HAS OVERPAID THE NUCLEAR REGULATORY COMMISSION FOR GOODS AND/OR SERVICES PROVIDED AND IS DUE A REFUND

EMPLOYEE/VENDOR/PAYEE CODE: _____

NAME: American Red Cross

ADDRESS: Attn: James R. Rowe, RSO

ADDRESS: 4860 Theboygan Avenue

CITY: Madison STATE: WI ZIP: 53705

TRANS CODE: PX

TRANS TYPE: FE FUND: X5280 JOB CODE: _____ AMOUNT: $1500.00

TRANS TYPE: IR FUND: R1435 JOB CODE: INTR AMOUNT: _____

TRANS TYPE: IR FUND: R1099 JOB CODE: ADCH AMOUNT: _____

TRANS TYPE: IR FUND: R1099 JOB CODE: FINE AMOUNT: _____

TOTAL REFUND AMOUNT: $1500.00

COMMENTS: Lic 48-15423-01/ Ck 30598/ Refd 4/18/95 rqst

(limit comments to 40 characters, including spaces)

PREPARED BY: Shirley Critchfield DATE: February 5, 1997

AUTHORIZED BY: Gordon Kindred DATE: 2/5/97

ORIGINAL INV. NO: _____ DATE PAID: _____ AMOUNT: _____

REFUND ENTERED INTO COLLECT BY: _____

REFUND DETERMINED BY: _____ DATE: _____

APR 20 III
REN 3E=760
3M=1500 PLEASE ATTACH APPROPRIATE SUPPORTING DOCUMENTATION
Ck # 30598 dtd 4/21/95
(#2260)
Refund per Licensee's 7/16/96 ltr. to delete 3M