November 8, 2011

Peter J. Lee, Ph.D., CHP
Health Physicist, Materials Control, ISFSI
United States Nuclear Regulatory Commission Region III,
Division of Nuclear Materials Safety
Decommissioning Branch
2443 Warrenville Road, Suite 210
Lisle, IL 60532-4352

Subject: License Number 13-24532-02 Termination Request
Mail Control Number 575854

Dear Doctor Lee:

This letter is to request termination of radioactive materials license number 13-24532-02 issued to Roche Diagnostics Operations, Inc. (Roche). Licensed activities have ceased and all licensed radioactive materials have been disposed. I have personally inspected the facility and verified that all licensed radioactive material and all radioactive markings have been removed from the site.

Roche procured Chase Environmental Group, Inc. (Chase) to perform an independent Historical Site Assessment (HSA) and author the enclosed Final Status Report to demonstrate that the facility meets the release criteria for unrestricted use specified in 10 CFR 20 Subpart E.

The Final Status Report provides conclusive evidence that the facility meets the criteria for unrestricted use. Based on the building occupancy scenario of NRC DandD dose modeling software version 2.1, an upper bound of the Total Effective Dose Equivalent (TEDE) to an average member of the critical group is < 10.3 mrem/year (< 41 % of the release criterion of 25 mrem/yr) based on the extremely conservative assumption that all long-lived licensed materials received over the history of the license were evenly distributed on a building surface in one spill event. Routine survey and closeout survey results indicate very low levels of removable activity were present at the site over its history (<200 dpm/100cm^2), supporting the ALARA component of the license termination criteria.

I appreciate your time and efforts with this matter and look forward to your response. If you have any questions or concerns, please contact me at (317) 902-9868.

Sincerely,

Thomas A. Schumacher

Thomas A. Schumacher, MS, CHP
Radiation Safety Officer
Encl: NRC Form 314
Final Status Report

NRC FORM 314 (12-2010) 10 CFR 30.36(j)(1); 40.42(j)(1); 70.38(j)(1); and 72.54(k)(5)(i)(1)(1)

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0028 EXPIRES: 10/31/2013

Estimated burden per response to comply with this mandatory collection request: 30 minutes. This submittal is used by NRC as part of the basis for its determination that the facility is released for unrestricted use. Send comments regarding burden estimate to the Information Services Branch (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by Internet e-mail to Infocollects.Resource@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0028), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

CERTIFICATE OF DISPOSITION OF MATERIALS

LICENSEE NAME AND ADDRESS	LICENSE NUMBER	DOCKET NUMBER
Roche Diagnostics Operations, INC 9115 Hague Road Indianapolis, IN 46250	13-24532-02	030-34052, 13-24532-02
	LICENSE EXPIRATION DATE: 04/13/2016	

A. LICENSE STATUS (Check the appropriate box)

☐ This license has expired. ☑ This license has not yet expired, please terminate it.

B. DISPOSAL OF RADIOACTIVE MATERIAL

(Check the appropriate boxes and complete as necessary. If additional space is needed, provide attachments)

The licensee, or any individual executing this certificate on behalf of the licensee, certifies that:

☐ 1. No radioactive materials have ever been procured or possessed by the licensee under this license.

☑ 2. All activities authorized by this license have ceased, and all radioactive materials procured and/or possessed by the licensee under this license number cited above have been disposed of in the following manner.

☑ a. Transfer of radioactive materials to the licensee listed below:
2/6/2009, QSA Global, Inc., Rusty Barrett, (800) 225.1383, LA-5934-L01, Amend 26

☑ b. Disposal of radioactive materials:

☑ 1. Directly by the licensee:
Decay-in-storage, sewage disposal

☐ 2. By licensed disposal site:

☑ 3. By waste contractor:
ADCO Services, Inc. 17650 Duvan Drive, Tinley Park, IL 60477 (708) 429-1660. Philotechnics, Ltd. 201 Renovare Blvd. Oak Ridge, TN 37830 (865) 483-0686. Energy Solutions, 1560 Bear Creek Road, Oak Ridge, TN 37830 (865) 220-1629. US Ecology, 109 Flint Road, Oak Ridge, TN 37830, (800) 567-2372.

✓ c. All radioactive materials have been removed such that any remaining residual radioactivity is within the limits of 10 CFR Part 20, Subpart E, and is ALARA.

C. SURVEYS PERFORMED AND REPORTED

☑ 1. A radiation survey was conducted by the licensee. The survey confirms:

☐ a. the absence of licensed radioactive materials

☑ b. that any remaining residual radioactivity is within the limits of 10 CFR 20, Subpart E, and is ALARA.

☑ 2. A copy of the radiation survey results:

☑ a. is attached; or ☐ b. is not attached (Provide explanation); or ☐ c. was forwarded to NRC on: _____ Date

☐ 3. A radiation survey is not required as only sealed sources were ever possessed under this license, and

☐ a. The results of the latest leak test are attached; and/or ☐ b. No leaking sources have ever been identified.

The person to be contacted regarding the information provided on this form:

NAME	TITLE	TELEPHONE (Include Area Code)	E-MAIL ADDRESS
Thomas A. Schumacher	Radiation Safety Officer	(317) 902-9868	radphysics@msn.com

Mail all future correspondence regarding this license to:
Thomas Schumacher/Katie Franssen SHE, L-6, 9115 Hague Road, Indianapolis, IN 46250

C. CERTIFYING OFFICIAL

I CERTIFY UNDER PENALTY OF PERJURY THAT THE FOREGOING IS TRUE AND CORRECT

PRINTED NAME AND TITLE	SIGNATURE	DATE
Thomas A. Schumacher, Radiation Safety Officer	Thomas A. Schumacher	November 8, 2011

WARNING: FALSE STATEMENTS IN THIS CERTIFICATE MAY BE SUBJECT TO CIVIL AND/OR CRIMINAL PENALTIES. NRC REGULATIONS REQUIRE THAT SUBMISSIONS TO THE NRC BE COMPLETE AND ACCURATE IN ALL MATERIAL RESPECT. 18 U.S.C. SECTION 1001 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.

Roche Diagnostics Operations, Inc.

Final Status Report

9115 Hague Road
Indianapolis, IN 46250

NRC License Number 13-24532-02

November 7, 2011

Prepared by:

Chase Environmental Group, Inc.
109 Flint Road
Oak Ridge, TN 37830
865-481-8801

Roche Diagnostics Operations, Inc.

Final Status Report

9115 Hague Road
Indianapolis, IN 46250

NRC License Number 13-24532-02

November 7, 2011

Prepared:	Dave Culp	Project Manager	Date:	11-7-11
Reviewed:	Patrick McDermott	Certified Health Physicist	Date:	11-7-11
Approved:	Thomas A. Schumacher, MS. CHP	Certified Health Physicist Roche RSO	Date:	11/8/11

CHASE
Environmental Group

Prepared by:
Chase Environmental Group, Inc.
109 Flint Road
Oak Ridge, TN 37830
865-481-8801

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TABLES

APPENDICES

ACRONYMS

ALARA	As Low As Reasonably Achievable
CFR	Code of Federal Regulations
$DCGL_{EMC}$	Derived Concentration Guideline Level – Elevated Measurement Comparison
$DCGL_W$	Derived Concentration Guideline Level – Wilcoxon Rank Sum
DSV	Default Screening Value
HSA	Historical Site Assessment
LSC	Liquid Scintillation Counter
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
MDC	Minimum Detectable Concentration
NRC	U.S. Nuclear Regulatory Commission
NIST	National Institute of Standards and Technology
RSO	Radiation Safety Officer
TEDE	Total Effective Dose Equivalent

1 INTRODUCTION

Roche Diagnostics Operations, Inc. (Roche) has ceased principal activities and decided to permanently decommission their research facility located at 9115 Hague Road in Indianapolis, IN in order to terminate US Nuclear Regulatory Commission (NRC) radioactive materials license No. 13-24532-02. The facility will be decommissioned for unrestricted use and retained by Roche.

Radioactive materials used at the facility consisted of a variety of radionuclides for research, including C-14, Co-57, Cr-51, H-3, I-125, In-111, P-32, P-33, and S-35. Based on an analysis of the default screening values, quantities used, physical forms, half-lives, and receipt and distribution records; H-3 and C-14 are the only nuclides of concern for decommissioning.

Roche procured Chase Environmental Group, Inc. (Chase) to perform an independent Historical Site Assessment (HSA) and author this report to demonstrate that the facility meets the release criteria for unrestricted use specified in 10 CFR 20 Subpart E.

The guidance provided in NUREG 1757, "Consolidated NMSS Decommissioning Guidance"; and NUREG 1575, "Multi-Agency Radiation Survey and Site Investigation Manual" (MARSSIM) are used for decommissioning this facility. Based on the quantities used relative to the default screening values, the site qualifies for the simplified procedure of MARSSIM, Appendix B, "Simplified Procedure For Certain Users of Sealed Sources, Short Half-Life Materials, and Small Quantities" because it can be demonstrated mathematically that, due to the small quantities of materials received, it is impossible to exceed the unrestricted release criteria of 25 mrem/yr.

This report presents sufficient data to support the conclusion that the facility meets the NRC release criteria. Based on the building occupancy scenario of NRC DandD dose modeling software version 2.1, **an upper bound of the Total Effective Dose Equivalent (TEDE) to an average member of the critical group is < 10.3 mrem/year (< 41 % of the release criterion of 25 mrem/yr) based on the extremely conservative assumption that all long-lived licensed materials received over the history of the license were evenly distributed on a building surface in one spill event.** Routine survey and closeout survey results indicate very low levels of removable activity were present at the site over its history (<200 dpm/100cm^2), supporting the ALARA component of the license termination criteria.

Roche requests that the NRC release the site for unrestricted use and terminate radioactive materials license No. 13-24532-02.

2 HISTORICAL SITE ASSESSMENT

Chase performed on-site portions of the HSA on August 25-26, 2011 and on October 14, 2011. The purpose of the HSA was to determine the current status of the facility including potential, likely, or known sources of radioactive contamination by gathering data from various sources. This data includes physical characteristics and location of the site as well as information found in site operating records, including radiological surveys. The records review included: radioactive materials licenses, license applications, amendment requests,

meeting minutes, radiological surveys (routine and closeouts), radionuclide receipt and distribution records, waste disposal records, incident reports, facility renovation records, blueprints, plans and design specifications. Personnel interviews included radiation safety, maintenance, operations, and facilities personnel. The results of the HSA are presented below.

2.1 License History

Radioactive materials license files were reviewed to identify historical operations, nuclides used, and quantities used. Essentially, licensed operations did not change much over the history of the license. Amendments typically made minor administrative changes and minor changes in authorized materials and quantities. Radioactive materials receipt records and license applications offered the most insight regarding the potential nuclides of concern and quantities used. Current and previous employees having knowledge of facility historical operations were interviewed. The interviewees' presence at the facility spanned the continuous period of facility operations from 1977 to present.

The facility currently operates under NRC license 13-24532-02, Amendment 9. Previously, the facility operated under licenses issued to Boehringer Mannheim Diagnostics, Bio-Dynamics/bmc and Bio-Dynamics. Bio-Dynamics was acquired by Boehringer Mannheim Corporation (BMC) in 1974 and became Bio-Dynamics/bmc, which was later acquired by Roche.

2.1.1 NRC License 13-24532-02

The facility currently operates under NRC license 13-24532-02, Amendment 9 issued September 14, 2009 with an expiration date of April 30, 2016. Amendment 9 possession limits and authorized uses are summarized in the table below.

Table 2-1: License 13-24532-02 Possession Limits and Uses

Nuclide	Physical Form	Possession Limit (mCi)	Authorized Use
I-125	Any	75	In-vitro laboratory experiments
C-14	Any	45	In-vitro laboratory experiments
H-3	Any	65	In-vitro laboratory experiments
S-35	Any	50	In-vitro laboratory experiments
P-32	Any	40	In-vitro laboratory experiments
P-33	Any	50	In-vitro laboratory experiments
Cr-51	Any	45	In-vitro laboratory experiments

Amendments were reviewed to evaluate how operations changed over the years and their relevance to decommissioning. Amendments are described in the table below.

Table 2-2: License 13-24532-02 Amendments

Amendment	Date	Description
9	9/14/09	Changed name from Roche Diagnostics Corporation to Roche Diagnostics Operations, Inc. and added sealed source leak test requirements
8	7/21/06	Changed RSO
7	4/7/06	Renewed in entirety – no significant changes
6	11/18/05	Added Authorized User
5	2/18/05	Modified decay-in storage requirements
4	2/10/05	Added Assistant RSO
3	1/16/04	Modified decay-in storage requirements – 120 day half-life
2	9/11/00	Changed RSO
1	11/27/98	Changed name from Boehringer Mannheim Diagnostics, Inc. to Roche Diagnostics Corporation and removed reference to 10 CFR 30.35 (g) for recordkeeping
Original	2/2/96	Same as license 13-24532-01 Amendment 8

2.1.2 NRC License 13-24532-01

The current license is a continuation of operations conducted under NRC license 13-24532-01. This license originated for possession of I-125 in pre-packaged kits and evolved into what is essentially the current license. Amendments were reviewed to evaluate how operations changed over the years and their relevance to decommissioning. Amendments are described in the table below.

Table 2-3: License 13-24532-01 Amendments

Amendment	Date	Description
8	10/14/93	Added P-33
7	4/18/91	Added Building E as a usage location (there is no documentation to indicate receipt of licensed materials in Building E)
6	10/23/90	Renewed in entirety
5	8/1/89	Changed Authorized Users, Deleted A Building T Lab (this was prior to receipt of long-lived nuclides)
4	3/15/89	Changed Authorized users and added D Building labs 204, 206, 207, 208, 223, 224, 222, 219, 220 as locations of usage
3	2/3/88	Added current nuclides except P-33
2	2/18/87	Could not locate
1	12/6/85	Changed Authorized Users
Original	8/1/85	Authorized I-125 only as pre-packaged kits up to 200 µCi

2.1.3 NRC License 13-24471-01

The license files contained a copy of Amendment 1 to NRC license number 13-24471-01 dated May 30, 1986 with a mailing address of Boehringer Mannheim Corporation Biochemicals Division at 7941 Castleway Drive, Indianapolis, IN. This is the only reference in the files to this license. The amendment added a 4 mCi limit for H-3. Based on an employee interview, only P-32 was used under this license from 1985 to 1987. The employee recalls performing a closeout survey consisting of wipe tests and sending the results to the NRC in 1988. The business unit that conducted these operations moved to Bldg. B (QC Lab/RAS Lab/B2001) and resumed usage of radioactive materials in the 1990s.

2.1.4 NRC Licenses 13-17999-02 and 13-17999-03

Bio-Dynamics/bmc Radiation Safety Committee meeting minutes from 1981 refer to NRC License numbers 13-17999-02 and 13-17999-03. The minutes discuss a notice of violation (NOV) related to personnel monitoring for I-125 exposures. While copies of these licenses aren't in the file, personnel interviews indicate that at that time, the only activities were for the manufacture of RIA kits containing I-125. Based on inference from site documentation, it seems that I-125 RIA kits were manufactured at the site in the late 1970's and early 1980's. In the mid 1980's, RIA kits appear to have been manufactured at a Bio-Dynamics/bmc site in Tustin, CA and distributed to the Indianapolis site. This is consistent with subsequent licensing and documentation. The meeting minutes also indicate that the RSO requested cancellation of license 13-17999-02 because License 13-17999-03 was duplicative with the exception of sealed sources that were no longer possessed.

2.1.5 Distribution Licenses 13-17999-04G and 13-17999-05E

RSC meeting minutes dated 9/21/82 indicates that Bio-Dynamics/bmc held license 13-17999-04G for general distribution and license 13-17999-05E for exempt distribution. There are no other records of these licenses. This is consistent with the manufacture of RIA kits at the site during that time.

2.1.6 10 CFR 40.22 General License

Small quantities of source material in the form of reagents were possessed within the terms of the general license described in 10 CFR 40.22. The general license provides an exemption from the provisions of Part 20. Therefore, these materials were not included as nuclides of concern for decommissioning.

2.1.7 State Registrations

Possession of accelerator-produced materials was under a registration issued by Indiana State Board of Health. This registration authorized the use of Co-57 for research. Additionally, there was documentation regarding the potential use of In-111 for research. However, there are no records of receipt of In-111. The Registration was closed out on 8/12/11.

2.2 Ownership

The facilities and property are owned by Roche. Roche plans to retain ownership of the property following decommissioning.

2.3 Facility Description

The original parcel of land was purchased in 1964. Plant One (Building P), the first building, was occupied in 1966 and the campus has been on a steady growth pattern ever since. The site currently consists of many buildings of varied usage. Most of the usage of radioactive materials was conducted in Buildings B and D, with very limited usage of short-lived nuclides in Buildings A and W. Buildings B and D are described in detail below. Building floor plans are provided in Appendix A.

2.3.1 D Building

The D Building, also known as the Research and Development (R&D) Building, is a two story building with a footprint of 53,000 GSF and 106,000 GSF of floor area. The D Building has been extensively remodeled. Renovations started about two years ago and are expected to be complete by November 2011. Original laboratory ventilation system design was once-through via fume hoods with exhaust fans located on the roof. Drains were directed to the sanitary sewer system without retention or treatment. The current renovation involved complete replacement of ventilation systems from fume hoods, removal/replacement of laboratory drain lines, and removal/replacement of the central vacuum system. The positions of the walls in some areas were changed significantly, including areas where radioactive materials were historically used.

On the 1st floor, some labs were removed and built out as office space. The demolition of labs included removal of all surfaces including lab fixtures, floor coverings, walls, and ceiling tiles. The historical usage labs on the first floor are still labs but the spaces were reconfigured. Additionally, the waste storage room on the first floor is still intact and not affected by renovation.

About half of the 2nd floor elevation was recently gutted and built out into office space. Room 209 (formerly Room 208 where a majority of the activity usage occurred) has been converted to a computer lab. The drain where sewer disposal of radioactive materials occurred has been removed. The original floor, wall, and ceiling coverings have been removed and replaced. Rooms 204 and 205 were converted into current Room 210, which is still a lab. An original hood was moved to a new location within the room and two new hoods have been added. Rooms 211, 212, and 215 (formerly Rooms 203,202, and 206) are still labs. Room 214 (formerly Room 207) still has original floor tiles and two floor drains. Former labs 219 and 222 are now office spaces and former lab 220 is a conference room. Room 203 (formerly Room 223) has been completely gutted, including three sinks, and a wall was installed.

2.3.2 B Building

The B Building is a two story building with a footprint of 35,000 GSF and 70,000 GSF of floor area. Almost all recent radioactive work (2004-2006) was performed in Lab B2001, which was an office space prior to 2004. Radioactive materials were used prior to 2004 in the QC Lab (Lab 2000). The QC Lab was remodeled around 2000-2002 to add Lab 2001. The remodel included replacement of floor surfaces and lab fixtures. Building B was extensively remodeled in 2007 and 2008. Laboratory ventilation systems are once-through vial fume hoods with exhaust fans located on the roof. Drains are directed to the sanitary sewer system without retention or treatment. There was never a central vacuum system in Building B.

The current campus layout is presented below.

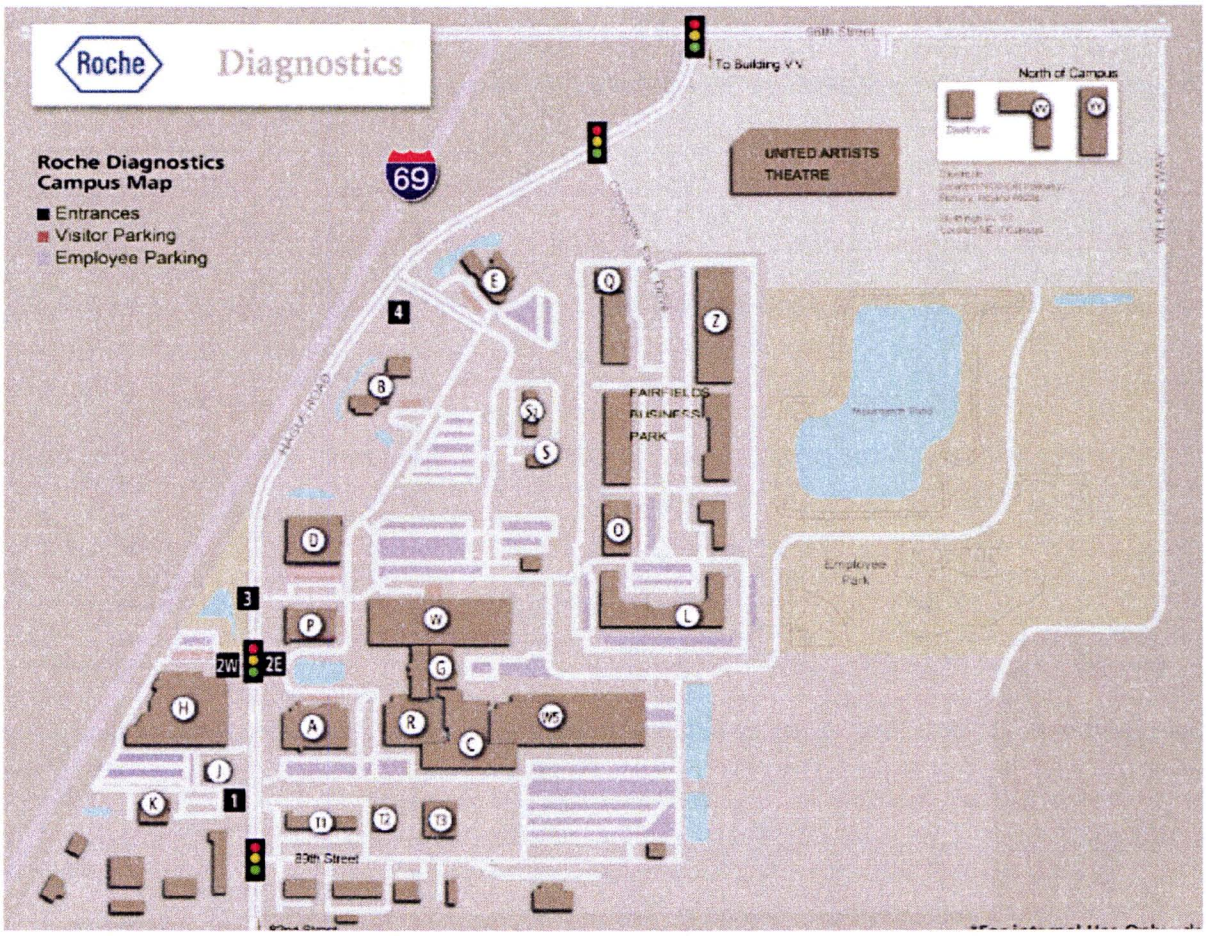


Figure 1: Site Layout

2.4 Areas of Usage

All storage and usage of radioactive materials were conducted indoors. There is no history of on-site disposals or burials of radioactive materials. Specific buildings and rooms in which licensed materials were stored or used are listed in license applications,

receipt records, RSC meeting minutes, etc. A compilation of areas of usage is presented in the table below.

Table 2-4: Rooms with Radioactive Materials Usage

Bldg.	Original Room No.	Current Room No.	Comments
A	T Lab	Offices	Never received long-lived activity. 9-28-87 license application, deleted in Amendment 5 - request letter dated 7/6/89.
B	2001	B 2001	aka RPEG Lab
B	QC Lab	B 2000	
B	Rad Waste Room	Storage Room	
D	Rad Waste Room	Rad Waste Room	
D	101	109	The lab used to be called Molecular Biology Lab (MB) where a majority of the work was done in the early 1990's.
D	102	105	9-28-87 application
D	121	108	
D	203	211 & 212	12/21/92 request for 5 mCi, but no record of usage. Receipt records indicate that if this quantity was actually used, it was a short-lived nuclide.
D	204	210	Map in license files
D	205	210	Map in license files
D	206	215	9-28-87 application
D	207	214	Map in license files
D	208	209	Map in license files. Area of highest usage – stock solutions stored in this room and aliquots distributed to other labs.
D	219	Offices	9-28-87 application
D	220	Conference Room 253	Map in license files
D	222	Offices	9-28-87 application
D	223	203	Discussion about H-3 in sealed incubators – person couldn't remember if actually performed.
D	224	216	Map in license files
W			Never received long-lived activity. Storage for DIS in Flammable Drum Room. Drums wiped down and surveyed prior to movement into storage location.

2.5 Receipt Records

Receipts of radioactive materials were recorded in a logbook from 5/11/89 to 5/18/06. These dates coincide with licensing and interviews with site personnel. There were 833

entries, only 45 of which were for long-lived nuclides (C-14 and H-3). A summary of all H-3 and C-14 receipts under licenses 13-24532-01 and 13-24532-02 are presented in the table below.

Table 2-5: Receipts of H-3 and C-14

Date/Receiver	H-3 (mCi)	C-14 (mCi)	Comments
5/11/89	---	---	First logbook entry.
8/89 Hansen	1	0.15	Two C-14 receipt entries were combined.
6/90 Hengst	0.25	---	
8/90 Hengst	0.5	---	
9/90 McCarthy	0.5	---	Two H-3 receipt entries were combined.
11/90 Hengst	0.5	---	Two H-3 receipt entries were combined.
1/91 McCarthy	0.5	---	Two H-3 receipt entries were combined.
3/91 Hengst	0.250	---	
3/91 Martin	5	---	
4/91 Hengst	0.5	---	Two H-3 receipt entries were combined.
4/91 Hengst	0.5	---	Two H-3 receipt entries were combined.
91 Hengst	0.5	---	Two H-3 receipt entries were combined.
9/91 Blach	---	0.05	
10/91 Blach	0.012	---	Two generally-licensed kits.
1/92 McCarthy	0.25	---	
3/92 McCarthy	0.25	---	
5/92 McCarthy	0.5	---	
5/92 Marie Dugg	0.012	---	Two generally-licensed kits.
8/92 Colvin, Reardon	0.25	---	
8/92 Reardon	0.25	---	
9/92 Reardon	0.25	---	
12/92 Reardon	0.25	---	
3/93 McCarthy	0.25	---	
5/93 McCarthy	0.25	---	
7/93 McCarthy	0.25	---	
93-94 Kennamer	0.5	---	
7/97 Kennamer	0.006	---	Generally-licensed kit.
2/98 Kennamer	0.006	---	Generally-licensed kit.
5/98 Kennamer	0.006	---	Generally-licensed kit.
7/10/98 Inventory	---	---	**13.950 mCi H-3, 0.2 mCi C-14**
8/98 Kennamer	0.006	---	Generally-licensed kit.
9/98 Kennamer	0.012	---	Two generally-licensed kits.
3/15/99 Disposal	---	---	**Off-Site Waste Disposal**
8/99 Kennamer	0.006	---	Generally-licensed kit.
12/99 Kennamer	0.012	---	Two generally-licensed kits.
3/06 Pennington	2	---	Used in B Building.
3/06 Pennington	1	---	Used in B Building.
5/22/06 Inventory	---	---	**3 mCi H-3**
Totals	**16.328**	**0.2**	**Total for Life of License**

Most of the activity was received in D Building, Room 208 where stock solutions were stored. Aliquots of labeled compounds were dispensed in Room 208 and distributed to the research laboratories.

2.6 Potential Contaminants

Potential contaminants were determined from license files, surveys, materials receipt records, and waste disposal records. Records, surveys and audits were available from the late 1970's to present. The records are fairly complete, but some information is missing for the early years of operations, prior to Roche's ownership of the site. Most of the activity possessed was in the form of short-lived nuclides. The nuclides and quantities were fairly consistent from year to year, and according to personnel interviewed, are consistent with operations from previous years where records are not complete.

The following table lists the nuclides used or potentially used at the facility in dispersible form. This list was compiled through review of radionuclide receipt, radioactive waste, audit and survey records as well as interviews with facility personnel.

Table 2-6: Radionuclides Used in Dispersible Form

Nuclide	Half Life (years)	NRC Licensed?	Half Life >120 days?
C-14	5,730 y	YES	YES
Co-57	271.8 d	NO	YES
Cr-51	27.8 d	YES	NO
H-3	12.3 y	YES	YES
I-125	60.2 d	YES	NO
In-111	2.8 d	NO	NO
P-32	14.3 d	YES	NO
P-33	24.4 d	YES	NO
S-35	87.9 d	YES	NO

Co-57 was possessed under a State registration. In 1996, there was a discussion with the NRC regarding the use In-111 (2.8 day half-life). The NRC replied that In-111 is regulated by the State of Indiana. There was no indication that this was pursued further, and there is no indication of In-111 usage at the site.

All sealed sources used at the site and have been removed and there was never any indication of leakage. Record of leak tests and source transfers are provided in Appendix B.

After considering quantities of radionuclides used, the locations of use, and the impact of radioactive decay, the nuclides of concern for decommissioning are H-3 and C-14.

2.7 Operational Radiological Surveys

During the HSA, the radiological status of the facility was determined by reviewing historical survey records and interviewing Radiation Safety personnel. During operation,

facility surfaces were maintained <200 dpm/100cm^2 removable surface contamination as demonstrated by routine periodic survey results.

2.8 Closeout Surveys

Laboratory closeout procedures were used when researchers completed experiments involving radioactive materials.

2.8.1 Closeout Surveys by Contractor

There are several reports for laboratory closeouts performed by a contractor. The following areas were surveyed:

- Building B Room 2001, performed 9/06 after last usage of radioactive materials under the current license.
- Building D Rooms 207, 208, and Waste Room, performed 9/02.
- Building D Waste Room, performed 2/15/11.
- Building D Rooms 121, 203, 204, 205, 206, 224 (original room numbers) performed 9/26/11.

2.8.2 Closeout Surveys Performed In-House

In-house closeout surveys were performed in the following areas:

- Building B, QC Lab, performed 8/24 -30/2000.
- Building B, Waste Room, performed 2/6/2001.
- Building D, Labs 219 and 220, performed 11/2000 and 8/3/2000 respectively. Surveys included vent ducts and exhaust fan on the roof.
- Building D, Closets outside of Labs 219 and 220, performed 12/3/2001.

A summary of closeout surveys is provided in the table below. Copies of closeout survey reports are provided in Appendix C.

Table 2-7: Usage Area Closeout Status

Building	Original Room No.	Current Room No.	Renovation Status	Close Out Status
A	T Lab	Offices	Completely renovated into office space. Never received long-lived activity	No record
B	2001	B 2001	Intact	9/2006 by Contractor
B	QC Lab	B 2000	Intact	8/2000 in-house
B	Rad Waste Room	Empty Storage Room	Intact	2/6/01 in-house
D	Rad Waste Room	Rad Waste Room	Intact	2/15/11 by Contractor
D	101	109	Completely renovated	No record
D	102	105	Completely renovated	No record
D	121	108	Mostly Intact	9/26/11 by Contractor
D	203	211 & 212	Mostly intact	9/26/11 by Contractor
D	204	210	Mostly intact	9/26/11 by Contractor
D	205	210	Mostly intact	9/26/11 by Contractor
D	206	215	Mostly intact	9/26/11 by Contractor
D	207	214	Mostly intact	9/2002 by Contractor
D	208	209	Completely renovated	9/2002 by Contractor
D	219	Offices	Completely renovated	No record
D	220	Offices	Completely renovated	No record
D	222	Offices	Completely renovated	No record
D	223	203	Completely renovated	No record
D	224	216	Intact	9/26/11 by Contractor
W	Drum Storage Room	Drum Storage Room	Decay-in-storage of short-lived nuclides only	No record

2.9 Waste Disposal Procedures

Most of the radioactive materials used at the facility were short-lived and were disposed by decay-in-storage (DIS) procedures. Long-lived radionuclides were disposed via commercial vendors to licensed disposal sites. Liquid wastes meeting the NRC requirements for sewer disposal were disposed via one of two specified drains; one in Building D, Room 208 and one in Building B, QC Laboratory. Sink disposal occurred from 6/91 to 9/92 and included 1.078 mCi of H-3. Most of the licensed materials were disposed off-site in March 1999. The last disposal of radioactive materials involved a difficult to dispose radiolabeled FDA controlled substance, and was conducted in February 2011 via a licensed radioactive waste broker. There are currently no licensed materials at the site.

Waste Manifests for off-site disposals are provided in Appendix D. Sewer Disposal Logs are provided in Appendix E.

2.10 Spills/Incidents

There is a record of one incident in 1992 involving a spill of P-32 in Building D affecting Rooms 101, 122, and adjacent offices that resulted in skin contamination of several personnel. Due to the short half-life of P-32, this is not of concern for decommissioning.

2.11 Previous Decommissioning Activities

There is no documentation from the NRC for termination of any historical license. However, there are several documents that indicate requests to terminate licenses or remove areas of usage.

- Letter to NRC requesting closure of a lab in Building A in 1987.
- Meeting minutes indicate that the RSO requested cancellation of license 13-17999-02.

3 FACILITY RELEASE CRITERIA

The radiological release criteria for unrestricted use are that of 10CFR20.1402: "*Radiological Criteria for Unrestricted Use*". The criteria are that residual radioactivity that is distinguishable from background radiation does not result in a TEDE to an average member of the critical group in excess of 25 mrem per year and that the residual radioactivity has been reduced to levels that are ALARA.

4 DERIVED CONCENTRATION GUIDELINE LEVELS (DCGLS)

The NRC has published default screening values (DSV) in NUREG 1757 for commonly used radionuclides. DSVs are derived using DandD v.2.1 software to model the building occupancy scenario together with default parameter values. Screening values are selected such that the 0.9 quantile of projected doses is less than or equal to 25 mrem/y (i.e., when probabilistic dose assessment calculations were performed, there was a 90% probability the calculated dose would be less than 25 mrem/year).

The DSV's are the basis for developing the Derived Concentration Guideline Levels (DCGL's). The DCGL is the radionuclide specific surface activity concentration that could result in a dose equal to the release criterion. Derived Concentration Guideline Level – Wilcoxon Rank Sum ($DCGL_W$) is the concentration limit if the residual activity is essentially evenly distributed over a large area. In the case of non-uniform contamination, MARSSIM allows for evaluation of higher levels of permissible activity over small areas using the Derived Concentration Guideline Level – Elevated Measurement Comparison ($DCGL_{EMC}$). $DGCL_{EMC}$ values are determined by maintaining default parameter values and varying the size of the contaminated area. Areas of 0.01 ($100cm^2$), 0.1, 1, and 10 m^2 were modeled to derived the $DCGL_{EMC}$ for a variety of sizes of elevated areas of residual radioactivity. The results for an area of 10 m^2 are equal to the DSVs published in NUREG 1757, Volume 1, Appendix B. For each model, an initial activity concentration of 1

dpm/100cm^2 was input to calculate a scaling factor in mrem/yr per dpm/100 cm^2. The results of modeling are summarized in the table below. DandD output reports are presented in Appendix F.

Table 4-1: $DCGL_{EMC}$ for Nuclides of Concern

Nuclide	Area (m^2)	DandD Result (mR/yr per dpm/100cm^2)	$DCGL_{EMC}$ (dpm/100cm^2)[1]
C-14	10	6.80E-6	3.7E6 (DSV)
	1	6.80E-7	3.7E7
	0.1	6.80E-8	3.7E8
	0.01	6.80E-9	3.7E9
H-3	10	2.02E-7	1.2E8 (DSV)
	1	2.02E-8	1.2E9
	0.1	2.02E-9	1.2E10
	0.01	2.02E-10	1.2E11

An important assumption of the dose model is that removable contamination is <10% of total contamination. Historical survey results and closeout records confirm that removable contamination levels are very low and meet this assumption.

5 CONTRACTOR CLOSEOUT SURVEYS PROTOCOLS

Areas of usage were reviewed to ensure adequate documentation of closeouts is available to support an ALARA analysis for decommissioning. Areas that have been completely renovated in a manner such that all potentially impacted surfaces have been removed (laboratory fixtures, floor covering, wall coverings, drains, and ventilation exhausts) are considered to be adequately documented by historical in-house routine surveys and lab closeouts that involved removable surface activity measurements. Areas that are still intact as labs and have remaining original surfaces and fixtures have all been surveyed by a contractor, Radiation Physics Consulting, using the protocol described below. Some intact areas identified during the HSA did not have closeout documentation that included direct measurements and were re-surveyed by the contractor to prepare this report.

Contractor closeout surveys were conducted by performing a combination of scan surveys and removable activity measurements as discussed further in this section. Detection sensitivities were an extremely small fraction of DSVs.

5.1 Radiological Criteria

Closeout surveys were designed to demonstrate compliance with the limits established in NUREG 1556, Volume 7, Table Q.2, *"Acceptable Surface Contamination Levels for Equipment."* Specifically, the following surface contamination limits were used:

[1] DCGL values in dpm/100cm^2 are calculated by dividing 25 mrem/yr by the DandD result in mrem/yr per dpm/100cm^2.

- 5,000 dpm/100cm^2 total surface contamination (averaged over 1m^2)
- 15,000 dpm/100cm^2 maximum total surface contamination (limited to 100 cm^2)
- 1,000 dpm/100cm^2 removable surface contamination

These limits are orders of magnitude less than the DSVs established by the NRC for unrestricted release of facilities.

5.2 Instrument Calibration

Radiation detection instruments were calibrated at least annually with National Institute of Standards and Technology (NIST) traceable H-3 and C-14 sources. Field instruments for determination of total surface activity by scanning and static measurements had an efficiency determined by a licensed calibration facility using a NIST traceable C-14 source.

5.3 Surface Scans

Scanning was used to identify locations of detectable residual radioactivity. Scan surveys were conducted over 100% of accessible surfaces less than a two-meter height by moving a wide area proportional detector at a distance of about 1/8 inch from the surface at a rate of one detector width every two seconds and listening for an increase in the audible response. If elevated activity was detected during the scan surveys, the location was remediated and resurveyed.

5.3.1 Scanning MDC

Scanning Minimum Detectable Concentration at a 95% confidence level was calculated using the following equation, which is a combination of MARSSIM equations 6-8, 6-9, and 6-10:

$$MDC_{scan} = \frac{d'\sqrt{b_i}\left(\frac{60}{i}\right)}{\sqrt{p}\cdot E_{tot}\cdot\frac{A}{100cm^2}}$$

Where:

MDC_{scan}	=	minimum detectable concentration (dpm/100cm^2)
d'	=	desired performance variable (1.38)
b_i	=	background counts during the residence interval (counts)
i	=	residence interval (seconds)
p		surveyor efficiency (0.5)
E_{tot}	=	total detector efficiency for radionuclide emission of interest (cpm/dpm)
A	=	detector probe area (cm^2)

A typical MDC_{SCAN} calculation for a wide area proportional detector at a rate of one detector width every 2 seconds is shown below:

$$b_i = 2\,\text{sec} \cdot \frac{1800\,\text{counts}}{\text{minute}} \cdot \frac{\text{minute}}{60\,\text{sec}} = 60\,\text{counts}$$

$$MDC_{SCAN} = \frac{1.38\sqrt{60}\left(\frac{60}{2}\right)}{\left(\sqrt{0.5}\right)(0.1)\left(\frac{200}{100}\right)} = 2{,}268\,\text{dpm/100cm}^2$$

5.3.2 Smear Counting MDC

Smear counting Minimum Detectable Concentration at a 95% confidence level was calculated using the following equation, which is an expansion of NUREG 1507, Table 3.1 (Strom & Stansbury, 1992):

$$MDC_{SMEAR} = \frac{3 + 3.29\sqrt{B_R \cdot t_s \cdot \left(1 + \frac{t_s}{t_b}\right)}}{t_s \cdot E}$$

Where:

MDC_{smear}	=	minimum detectable concentration (dpm/100cm^2)
B_R	=	background count rate (counts per minute)
t_b	=	background count time (minutes)
t_s	=	sample count time (minutes)
E_{tot}	=	Instrument efficiency for radionuclide emission of interest (cpm/dpm)

Typical MDC calculations for H-3 and C-14 are shown below.

$$^3\text{H MDC}_{\text{SMEAR}} = \frac{3 + 3.29\sqrt{(12)(1)\left(1 + \frac{1}{1}\right)}}{(1)(0.40)} = 48\,\text{dpm}$$

$$^{14}\text{C MDC}_{\text{SMEAR}} = \frac{3 + 3.29\sqrt{(13)(1)\left(1 + \frac{1}{1}\right)}}{(1)(0.80)} = 25\,\text{dpm}$$

6 DEMONSTRATION OF COMPLIANCE

Based on the quantities of radioactive materials received, it can be mathematically demonstrated that the facility meets the release criteria of 25 mrem per year.

An extremely conservative scenario is assumed in order to calculate an upper bound of potential doses from residual licensed materials. The scenario assumes the sum of all historical receipts of C-14 and H-3 are evenly distributed on building structural surfaces in a single spill event. The resultant surface contamination was calculated assuming all long lived radioactive materials were evenly distributed over the areas modeled to develop $DCGL_{EMC}$ values. The contamination levels were then compared to the $DCGL_{EMC}$ values.

This is conservative because:

- There is no history of spills of long-lived radioactive materials
- All receipts are assumed to have been spilled in one area. Room D208, where most of the activity was possessed has been thoroughly surveyed several times to verify that no significant residual radioactivity was spilled, and has been extensively renovated.
- Receipts were distributed to different buildings and areas, so not all materials were collected in any one place at one time.
- Waste records indicate that most long lived materials were disposed off-site
- Spills of large quantities of materials would have been detected during routine surveys and closeout surveys
- Extensive closeout surveys have been conducted in usage areas.

The results of these calculations are summarized in the table below and provide an extremely conservative upper bound of potential doses from residual licensed materials. Modeled doses for areas less than $10m^2$ are constant because the calculated residual surface activity concentration increases with decreasing area by the same factor as the $DCGL_{EMC}$. Modeled doses for areas greater than 10 m^2 decrease with increasing area.

Table 6-1: Dose Calculations

Area (m^2)	Nuclide	$DCGL_{EMC}$ ($dpm/100cm^2$)	Maximum[2] Surface Activity ($dpm/100cm^2$)	Fraction of $DCGL_{EMC}$	Sum of Fractions	Dose[3] (mrem/yr)
10	C-14	3.7E6	4.4E5	0.12	0.41	10.3
	H-3	1.2E8	3.6E7	0.29		
1	C-14	3.7E7	4.4E6	0.12	0.41	10.3
	H-3	1.2E9	3.6E8	0.29		
0.1	C-14	3.7E8	4.4E7	0.12	0.41	10.3
	H-3	1.2E10	3.6E9	0.29		
0.01 ($100cm^2$)	C-14	3.7E9	4.4E8	0.12	0.41	10.3
	H-3	1.2E11	3.6E10	0.29		

7 ALARA ANALYSIS

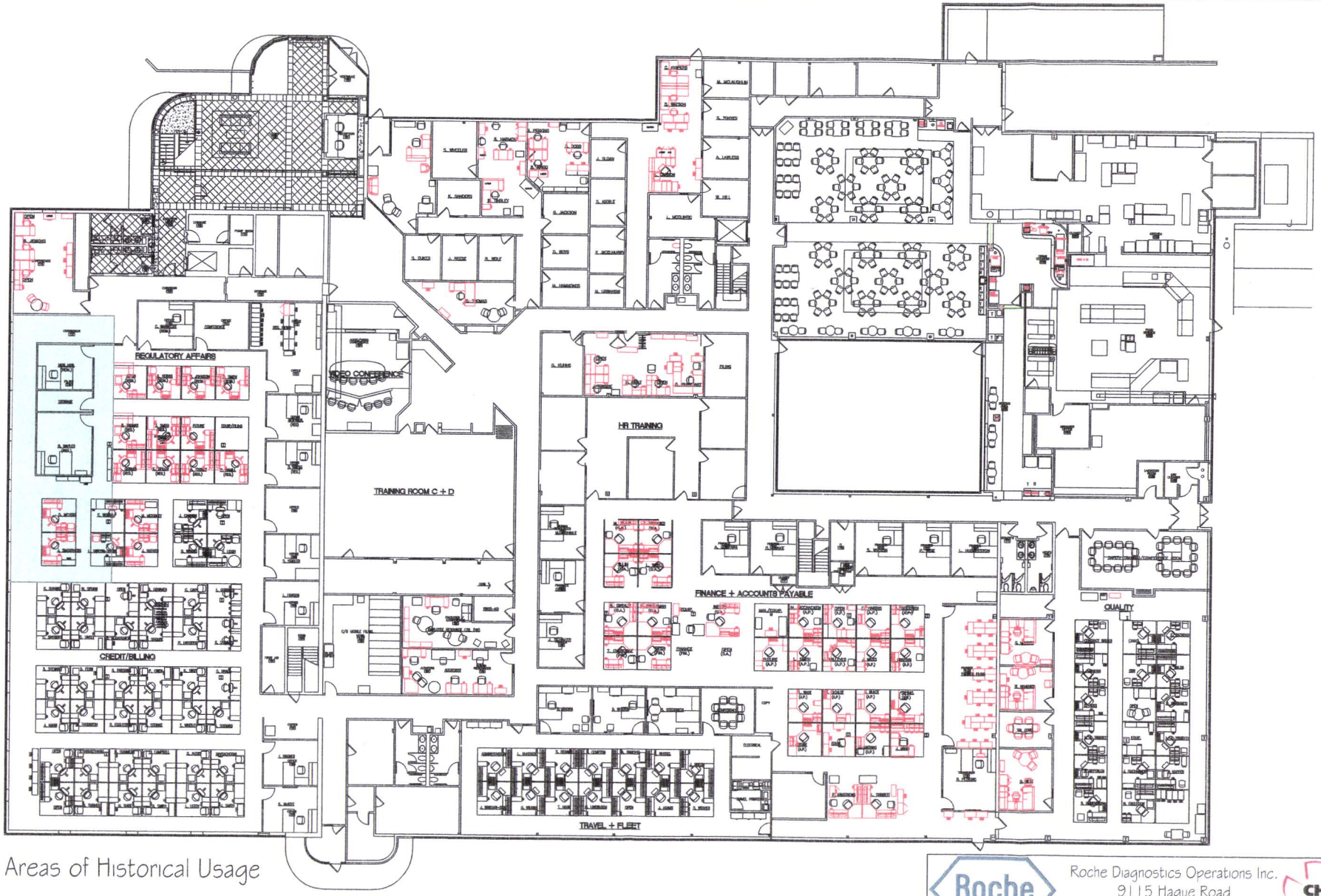
Due to the extremely low doses associated with residual radioactivity at the facility, a quantitative ALARA analysis is not required per the guidance in NUREG 1757, Volume 2, Appendix N. Default screening values were used to establish DCGLs and very restrictive removable contamination limits were applied throughout the life of the license. Roche routinely maintained all areas of the facility at <200 $dpm/100cm^2$ removable activity as demonstrated by historical routine survey and laboratory closeout survey results.

8 REFERENCES

- Roche Diagnostics Operations, Inc. Historical Site Assessment
- Roche Diagnostics Operations, Inc. Radioactive Materials License Number 13-24532-02
- NRC Regulations 10 CFR 20 Subpart E
- NUREG-1575, "Multi-Agency Radiation Survey and Site Investigation Manual" (MARSSIM)
- NUREG 1507, "Minimum Detectable Concentrations with Typical Radiation Survey Instruments for Various Contaminants and Field Conditions"
- NUREG 1757, Volume 1 "Consolidated NMSS Decommissioning Guidance," September, 2002
- NUREG 1556, Volume 7, Table Q.2, "Acceptable Surface Contamination Levels for Equipment."
- ISO-7503-1, "Evaluation of Surface Contamination – Part 1: Beta Emitters and Alpha Emitters." 1988

[2] The maximum surface activity is determined by evenly distributing the sum of all historical receipts of long-lived licensed radioactive materials (16.328 mCi H-3 and 0.2 mCi C-14) over the area modeled.

[3] The dose is calculated by multiplying the sum of fractions by the unrestricted release criterion of 25 mrem/yr.



Areas of Historical Usage

Roche

Roche Diagnostics Operations Inc.
9115 Hague Road
Historical Site Assessment

CHASE Environmental Group Inc.

Building: A	Elevation: 1st	Page: A.1 of A.5

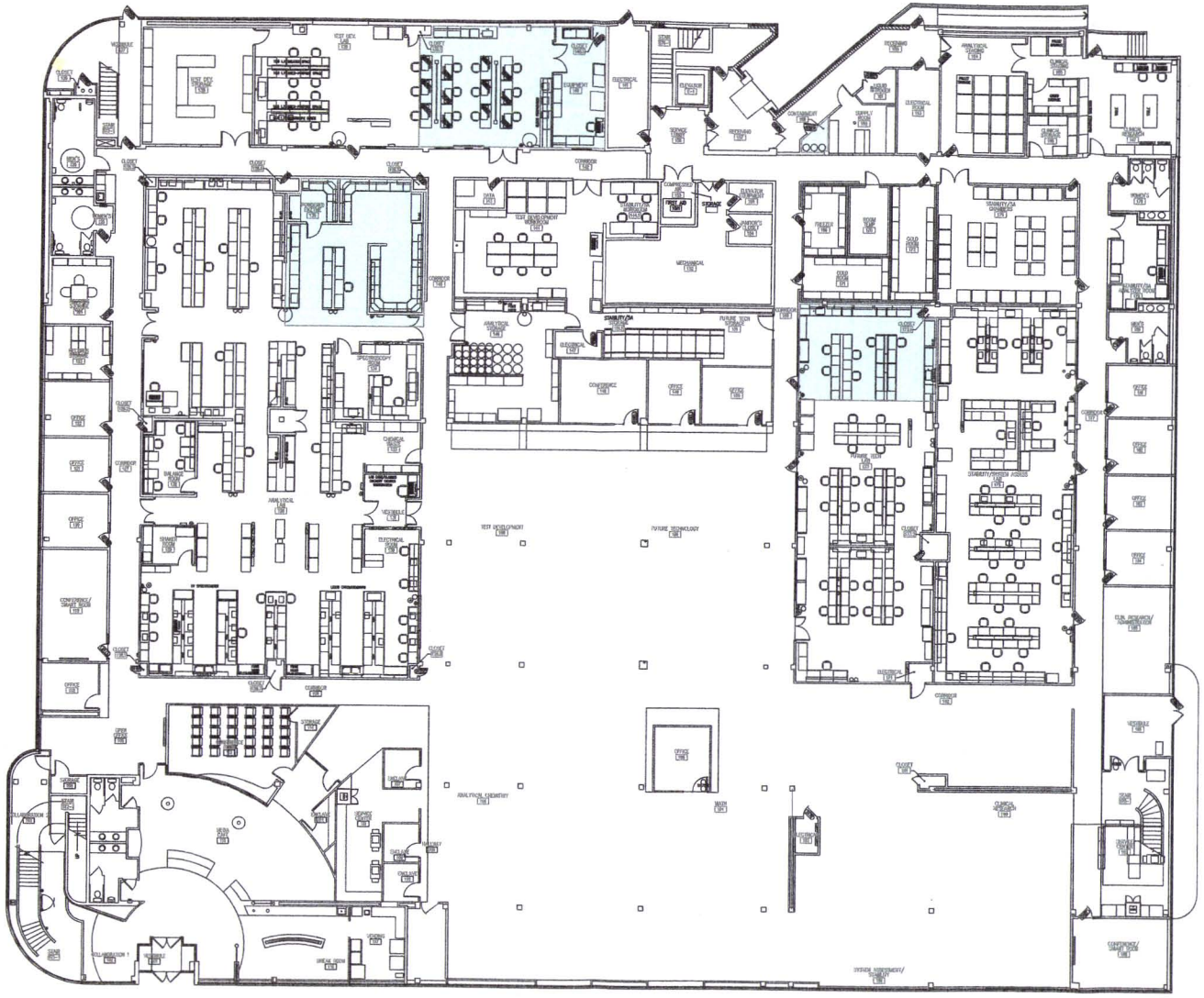
Areas of Historical Usage

Roche

Roche Diagnostics Operations Inc.
9115 Hague Road
Historical Site Assessment

CHASE Environmental Group Inc.

Building: B	Elevation: 2nd	Page: A.2 of A.5



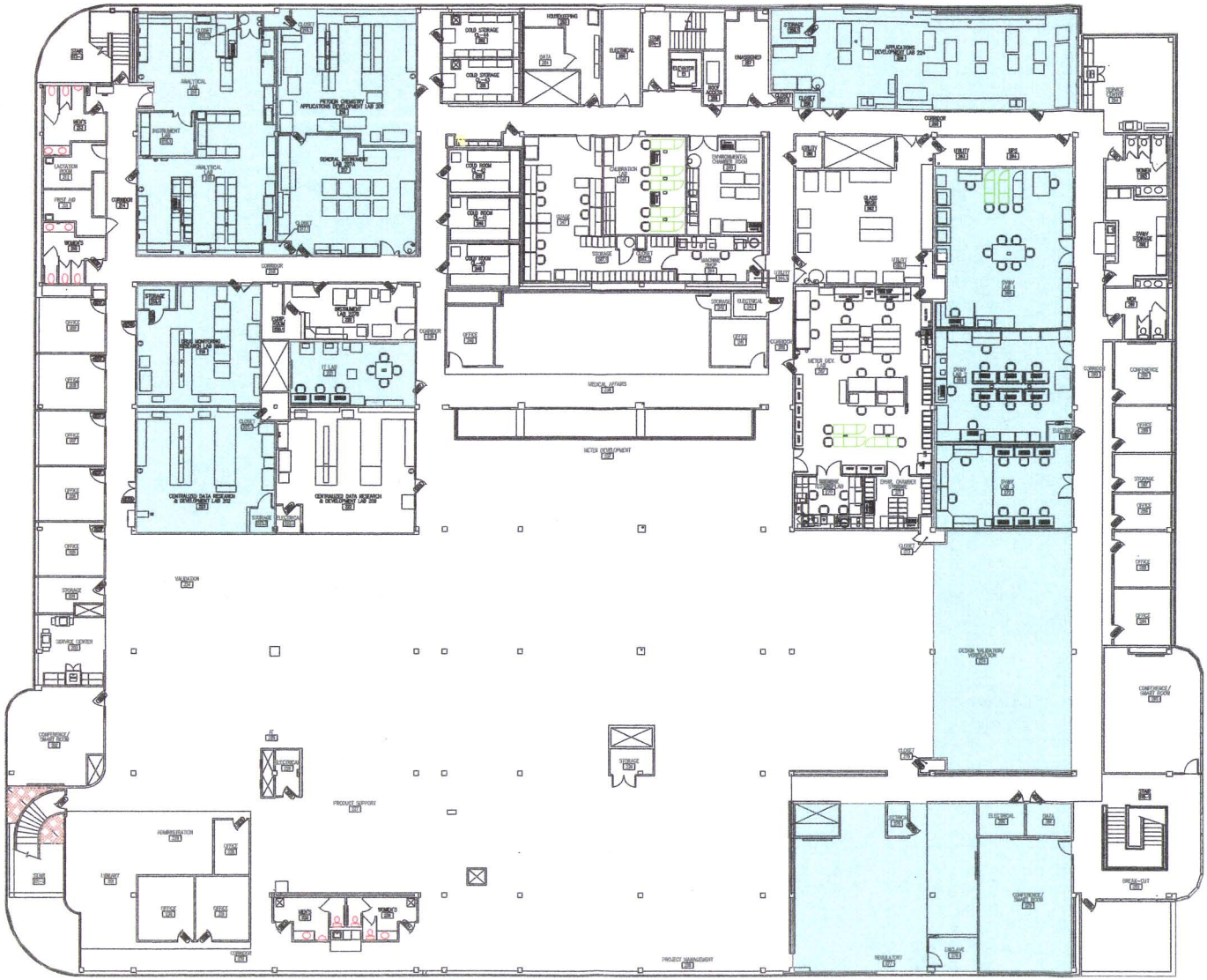
Areas of Historical Usage

Roche

Roche Diagnostics Operations Inc.
9115 Hague Road
Historical Site Assessment

CHASE Environmental Group inc.

Building: D	Elevation: 1st	Page: A.3 of A.5



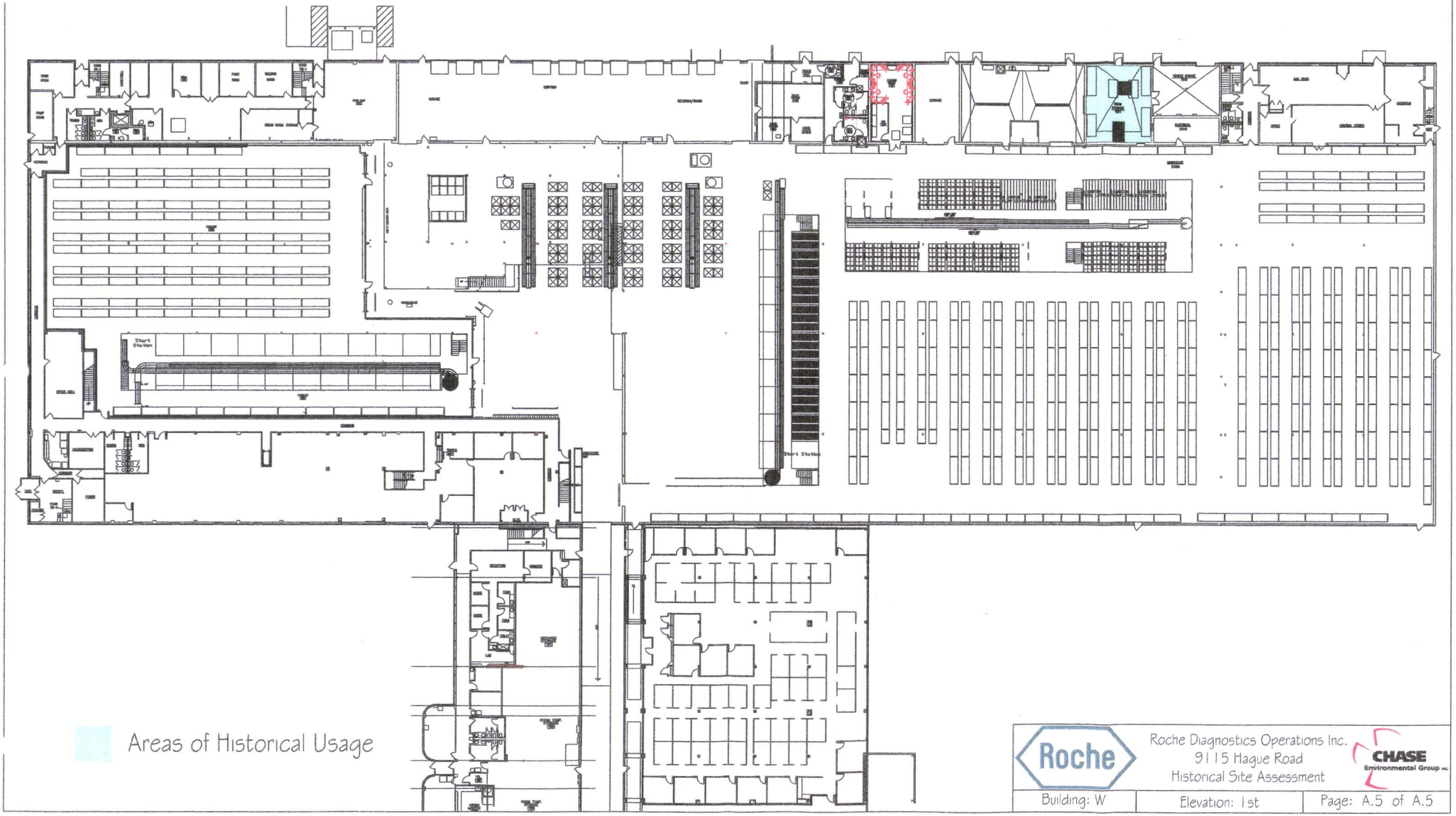
Areas of Historical Usage

Roche

Roche Diagnostics Operations Inc.
9115 Hague Road
Historical Site Assessment

CHASE Environmental Group inc

Building: D	Elevation: 2nd	Page: A.4 of A.5



Areas of Historical Usage

Roche

Roche Diagnostics Operations Inc.
9115 Hague Road
Historical Site Assessment

CHASE Environmental Group Inc.

Building: W	Elevation: 1st	Page: A.5 of A.5

LOUISIANA DEPARTMENT OF ENVIRONMENTAL QUALITY
EMERGENCY AND RADIOLOGICAL SERVICES DIVISION
P.O. BOX 4312
BATON ROUGE, LOUISIANA 70821-4312

RADIOACTIVE MATERIAL LICENSE

Pursuant to the Louisiana Environmental Quality Act (Louisiana Revised Statutes 30:2101 et seq.) and the Louisiana Radiation Regulations, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, own, possess and transfer radioactive material for the purpose(s) and at the place(s) designated below. This license shall be deemed to contain the conditions specified in the Louisiana Revised Statutes 30: 2105 of the Louisiana Nuclear Energy and Radiation Control Law, and is subject to all applicable rules, regulations, and orders of the Department now or hereinafter in effect, including the Louisiana Radiation Regulations (LAC 33:XV) and to any condition specified in the license.

LICENSEE	LICENSE NUMBER	EXPIRATION DATE
QSA Global, Inc. 40 North Avenue Burlington, Massachusetts 01803 Attention: Charles Ellars Radiation Safety Officer	LA-5934-L01	May 31, 2014
	PREVIOUS AMENDMENTS ARE VOID AMENDMENT NUMBER 26	AI NUMBER 38955
	THIS LICENSE ISSUED PURSUANT TO AND IN ACCORDANCE WITH Renewal Application	
	SIGNED BY Michael Fuller	DATE March 19, 2009

RADIONUCLIDE (Symbol)	RADIONUCLIDE (Mass No)	LAXIMUM NUMBER OF SOURCES*	MAXIMUM ACTIVITY OR QUANTITY PER SOURCE*	SEALED SOURCE MANUFACTURER, MODEL NUMBER, CHEMICAL FORM—PHYSICAL STATE	STORAGE CONTAINER OR EXPOSURE DEVICE; AUTHORIZED USE
Co	60	Any	1,500 Ci	Sealed Sources	Distribution and Demonstration of Sealed Sources; Research and Development; Instrument Calibration; Emergency Source Retrieval
Se	75	Total	1,000 Ci	Sealed Sources	Distribution and Demonstration of Sealed Sources; Research and Development; Instrument Calibration; Emergency Source Retrieval
Cs	137	Any	1,000 Ci	Sealed Sources	Distribution and Demonstration of Sealed Sources; Research and Development; Instrument Calibration; Emergency Source Retrieval
Ir	192	Any	15,000 Ci	Sealed Sources	Distribution and Demonstration of Sealed Sources; Research and Development; Instrument Calibration; Emergency Source Retrieval
U	238	Total	10,000 Kg	Solid	Shielding Material; Research and Development; Instrument Calibration
Any	3-218		100 Ci per Radio-nuclide	Sealed Sources or Leak Test Samples	Distribution, Repackage, Transfer, Demonstration; Research and Development; Instrument Calibration; Leak Testing

*pCi-picocurie, µCi-Microcurie, mCi-Millicurie, Ci-Curie

Peggy M. Hatch
Assistant Secretary

DATE 5/29/09

LOUISIANA DEPARTMENT OF ENVIRONMENTAL QUALITY
RADIOACTIVE MATERIAL LICENSE

LICENSEE	LICENSE NUMBER	AMENDMENT NUMBER	AI NUMBER	
QSA Global, Inc.	LA-5934-L01	26	38955	Page 2 of 4 Page(s)

Ra	226	Total	25 Ci	Sealed Sources or Leak Test Samples	Distribution and Demonstration of Sealed Sources; Research and Development; Instrument Calibration; Leak Testing; Emergency Source Retrieval
Ac	227	Total	25 Ci	Sealed Sources or Leak Test Samples	Distribution and Demonstration of Sealed Sources; Research and Development; Instrument Calibration; Leak Testing
Th	232	Total	25 Ci	Sealed Sources or Leak Test Samples	Distribution and Demonstration of Sealed Sources; Research and Development; Instrument Calibration; Leak Testing
Am	241	Total	200 Ci	Sealed Sources or Leak Test Samples	Distribution and Demonstration of Sealed Sources; Research and Development; Instrument Calibration; Leak Testing; Emergency Source Retrieval
Cm	244	Total	25 Ci	Sealed Sources or Leak Test Samples	Distribution and Demonstration of Sealed Sources; Research and Development; Instrument Calibration; Leak Testing
Cf	252	Total	25 Ci	Sealed Sources or Leak Test Samples	Distribution and Demonstration of Sealed Sources; Research and Development; Instrument Calibration; Leak Testing

The licensee is hereby authorized to perform the following services:

1. Demonstration, distribution and testing of industrial and radiography sources;
2. Emergency retrieval of industrial and radiography souroes;
3. Instruction in the emergency retrieval of industrial and radiography sources;
4. Distribution of approved leak test kits and perform leak tests;
5. Calibration of radiation detection instruments;
6. Installation, relocation, repair/maintenance, packaging, leak testing and radiation surveys for gauges and measuring devices;
7. Exchange of industrial radiography sources;
8. Receive, repackage, re-use/reoycle and/or transfer sources to a licensed organization that prepares the sources for disposal or a licensed disposal facility; and
9. Research and development

LOUISIANA DEPARTMENT OF ENVIRONMENTAL QUALITY
RADIOACTIVE MATERIAL LICENSE

LICENSEE	LICENSE NUMBER	AMENDMENT NUMBER	AI NUMBER	
QSA Global, Inc.	LA-5934-L01	26	38955	Page 3 of 4 Page(s)

10. Receive, repackage, and make final disposition of leaking sources to a licensed facility in accordance with letter dated May 27, 2005.

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1. Radioactive material shall be used by, or under the supervision of, individuals designated by the licensee's Radiation Protection and General Safety Committee.

2. A. Radioactive materials shall be used and stored at:

QSA Global, Inc. AI No. 83179
5765 Langley Drive
Baton Rouge, Louisiana 70809

B. Radioactive materials shall also be used at temporary jobsites of the licensee for the services listed below:

1) Possession, storage, and handling incident to distribution to persons authorized to receive the licensed material pursuant to the terms and conditions of a specific license issued by the Department, an Agreement State or the U. S. Nuclear Regulatory Commission;

2) Demonstration of sources/devices;

3) Research and development;

4) Leak testing of sources/devices as a customer service;

5) Instrument calibration as a customer service;

6) Installation, relocation, repair/maintenance, packaging and radiation surveys for gauges and measuring devices; and

7) Exchange of industrial radiography sources.

8) Emergency retrieval of industrial and radiography sources.

3. The Radiation Safety Officer for this license is Charles Ellars. The Site Radiation Safety Officer is Rusty Barrett.

4. The licensee shall conduct leak tests in accordance with LAC 33:XV.426 and 544.

5. Sealed sources shall not be opened by the licensee.

6. The licensee is authorized to repair, modify, dismantle or effect a change in a gauge which is being installed, maintained, relocated, or leak tested, provided that each modification has been previously evaluated by the Department, an Agreement State, or the U.S. Nuclear Regulatory Commission.

7. The licensee shall conduct a physical inventory every six months to account for all sources and/or devices received and possessed under the license. Records of inventories shall be maintained for two years from the date of each inventory.

LOUISIANA DEPARTMENT OF ENVIRONMENTAL QUALITY
RADIOACTIVE MATERIAL LICENSE

LICENSEE	LICENSE NUMBER	AMENDMENT NUMBER	AI NUMBER	
QSA Global, Inc.	LA-5934-L01	26	38955	Page 4 of 4 Page(s)

8. The Department shall require financial assurance in accordance with LAC 33.XV.325 and LAC 33.XV.351, except that all radioactive material rather than specifically by-product material, will be considered in the financial assurance requirements.

9. The licensee shall submit an updated decommissioning funding plan to be reviewed and approved by the Department three (3) years from the date of the most recent financial assurance review, performed March 30, 2009.

10. The licensee must submit notification to the Department announcing the dates of the source retrieval class at least two (2) weeks in advance.

11. If, in an emergency, it becomes necessary for the licensee to evacuate the facility at which radioactive material is stored, it shall be the responsibility of the licensee to notify the Office of Environmental Compliance (225) 219-3041 prior to leaving. The licensee shall submit a detailed description of how the storage location was secured prior to leaving and the licensee's temporary address, phone number(s) or other means of being contacted. This information shall be kept updated until the licensee is able to return to the licensed storage location.

12. The licensee shall comply with the requirements described in Order EA-07-305 (the Order). The licensee shall complete implementation of said requirements within 180 days from the issuance of the license amendment. The licensee shall notify the Department of Environmental Quality when they have achieved full compliance with the requirements described in the Order. The notification shall be made within twenty-five days after full compliance has been achieved. This notification shall include a certification that the Trustworthiness and Reliability (T&R) Official (and any subsequent T&R Official) is themselves deemed trustworthy and reliable by the Licensee as required in paragraph B.2. of the Order. The licensee shall notify the Department of Environmental Quality within 24 hours if the results from a criminal history records check indicate that an individual is identified on the FBI's Terrorist Screening Data Base.

13. A. Except as specifically provided otherwise by the license, the licensee shall possess and use radioactive material described in all schedules of this license in accordance with LAC 33:XV and statements, representations and procedures contained in the licensee's application (complete submission) dated March 24, 2009, and in all subsequent correspondence.

B. The licensee shall comply with the requirements described in the Louisiana Department of Environmental Quality letter dated November 3, 2005 and attached document entitled "Increased Controls for Licensees that Possess Sources Containing Radioactive Material Quantities of Concern." The licensee shall complete implementation of said requirements within 6 months from the issuance of the license amendment or the first day that radionuclides in quantities of concern are possessed at or above the limits specified in Table 1 of the attachment, whichever is later. Within 25 days after the implementation of the requirements of this condition, the licensee shall notify the Department of Environmental Quality in writing that it has completed the requirements of this condition.

PMH:JR

LEAK TEST CERTIFICATE

Owner: ROCHE DIAGNOSTICS
Address: Indianapolis, IN - USA
Model/Serial Number: 102 S/N 3720

Source Number	1466 LQ
Manufacturer	Amersham
Isotope	Am-241
Strength	5.55 GBq / 150 mCi
Model Number	AMCP6
Date Wiped	29-Aug-95
Results*	<4.0 Bq / <.0001 microcuries
Shutter Check	Performed

Approved By:

Dated:

29-Aug-95

*<185 becquerels / <.005 microcuries indicates non-leaking source

NDC Infrared Engineering Inc., 5314 North Irwindale Avenue, Irwindale, CA 91706 USA
Telephone : (626) 960 - 3300, Fax: (626) 939-3870, info@ndcinfrared.com
www.ndcinfrared.com

LEAK TEST CERTIFICATE

Owner: ROCHE DIAGNOSTICS

Address: Indianapolis, IN - USA

Model/Serial Number: 102 S/N 3721

Source Number	1476 LQ
Manufacturer	Amersham
Isotope	Am-241
Strength	5.55 GBq / 150 mCi
Model Number	AMCP6
Date Wiped	29-Aug-95
Results*	<4.0 Bq / <.0001 microcuries
Shutter Check	Performed

Approved By:

Dated:

29-Aug-95

*<185 becquerels / <.005 microcuries indicates non-leaking source

NDC Infrared Engineering Inc., 5314 North Irwindale Avenue, Irwindale, CA 91706 USA
Telephone : (626) 960 - 3300, Fax: (626) 939-3870, info@ndcinfrared.com
www.ndcinfrared.com

LEAK TEST CERTIFICATE

Owner: ROCHE DIAGNOSTICS
Address: Indianapolis, IN - USA
Model/Serial Number: 102 S/N 3720

Source Number	1466 LQ
Manufacturer	Amersham
Isotope	Am-241
Strength	5.55 GBq / 150 mCi
Model Number	AMCP6
Date Wiped	27-Sep-98
Results*	<4.0 Bq / <.0001 microcuries
Shutter Check	Performed

Approved By:

Dated:

02-Oct-98

***<185 becquerels / <.005 microcuries indicates non-leaking source**

NDC Infrared Engineering Inc., 5314 North Irwindale Avenue, Irwindale, CA 91706 USA
Telephone : (626) 960 - 3300, Fax: (626) 939-3870, info@ndcinfrared.com
www.ndcinfrared.com

LEAK TEST CERTIFICATE

Owner: ROCHE DIAGNOSTICS
Address: Indianapolis, IN - USA
Model/Serial Number: 102 S/N 3721

Source Number	1476 LQ
Manufacturer	Amersham
Isotope	Am-241
Strength	5.55 GBq / 150 mCi
Model Number	AMCP6
Date Wiped	27-Sep-98
Results*	<4.0 Bq / <.0001 microcuries
Shutter Check	Performed

Approved By:

Dated:

02-Oct-98

*<185 becquerels / <.005 microcuries indicates non-leaking source

NDC Infrared Engineering Inc., 5314 North Irwindale Avenue, Irwindale, CA 91706 USA
Telephone : (626) 960 - 3300, Fax: (626) 939-3870, info@ndcinfrared.com
www.ndcinfrared.com

LEAK TEST CERTIFICATE

Owner: ROCHE DIAGNOSTICS

Address: Indianapolis, IN - USA

Model/Serial Number: 102 S/N 3720

Source Number	1466 LQ
Manufacturer	Amersham
Isotope	Am-241
Strength	5.55 GBq / 150 mCi
Model Number	AMCP6
Date Wiped	29-Sep-01
Results*	<4.0 Bq / <.0001 microcuries
Shutter Check	Performed

Approved By:

Dated:

13-Oct-01

*<185 becquerels / <.005 microcuries indicates non-leaking source

NDC Infrared Engineering Inc., 5314 North Irwindale Avenue, Irwindale, CA 91706 USA
Telephone : (626) 960 - 3300, Fax: (626) 939-3870, info@ndcinfrared.com
www.ndcinfrared.com

LEAK TEST CERTIFICATE

Owner: ROCHE DIAGNOSTICS
Address: Indianapolis, IN - USA
Model/Serial Number: 102 S/N 3721

Source Number	1476 LQ
Manufacturer	Amersham
Isotope	Am-241
Strength	5.55 GBq / 150 mCi
Model Number	AMCP6
Date Wiped	29-Sep-01
Results*	<4.0 Bq / <.0001 microcuries
Shutter Check	Performed

Approved By:

Dated:

13-Oct-01

*<185 becquerels / <.005 microcuries indicates non-leaking source

NDC Infrared Engineering Inc., 5314 North Irwindale Avenue, Irwindale, CA 91706 USA
Telephone : (626) 960 - 3300, Fax: (626) 939-3870, info@ndcinfrared.com
www.ndcinfrared.com

LEAK TEST CERTIFICATE

Owner: ROCHE DIAGNOSTICS
Address: Indianapolis, IN - USA
Model/Serial Number: 102 S/N 3720

Source Number	1466 LQ
Manufacturer	Amersham
Isotope	Am-241
Strength	5.55 GBq / 150 mCi
Model Number	AMCP6
Date Wiped	31-Aug-04
Results*	<4.0 Bq / <.0001 microcuries
Shutter Check	Performed

Dated:

10-Sep-04

Approved By:

Frank Aguirre
Radiation Safety Officer

*<185 becquerels / <.005 microcuries indicates non-leaking source

NDC Infrared Engineering Inc., 5314 North Irwindale Avenue, Irwindale, CA 91706 USA
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LEAK TEST CERTIFICATE

Owner: ROCHE DIAGNOSTICS

Address: Indianapolis, IN - USA

Model/Serial Number: 102 S/N 3721

Source Number	1476 LQ
Manufacturer	Amersham
Isotope	Am-241
Strength	5.55 GBq / 150 mCi
Model Number	AMCP6
Date Wiped	31-Aug-04
Results*	<4.0 Bq / <.0001 microcuries
Shutter Check	Performed

Dated:

10-Sep-04

Approved By:

Frank Aguirre
Radiation Safety Officer

*<185 becquerels / <.005 microcuries indicates non-leaking source

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Telephone : (626) 960 - 3300, Fax: (626) 939-3870, info@ndcinfrared.com
www.ndcinfrared.com

Leak Test Certification

Report Date: September 23, 2007.

Facility:	Roche Diagnostics 9115 Hague Road P.O. Box 50457 Indianapolis, IN 46250-0457
Equipment:	NDC Systems Model: 102 **s/n 3720**
Source No.	1466 LQ
Radionuclide	Americium-241
Strength	150 mCi (5.6 GBq)
Model No.	AMCP6
Date of Wipe Sample	9/4/07

Report Prepared for: Dave Shallenberger, Manufacturing Engineering

---

Testing Method: All accessible areas of the sensor head were wiped with a paper wipe pad.

Analysis: All samples were analyzed for removable alpha radioactivity in a liquid scintillation counter (*Packard Model LS-6000IC*). Efficiency is assumed to be 100% for alpha detection in the liquid scintillation media for radioactivity removed by the paper wipe sample.

Results:	Liquid Scintillation Counter	
Sample No.	Net Region counts per minute	**Activity**
Background	33	
Sensor	1285	**0.000584 uCi**
		Minimum Detectable Activity= 0.0000538 uCi

Shutter Check: Performed

Summary: **The leak test demonstrates that the detectable leakage of Americium-241 from the device source is within the 0.005 uCi (185 Bq) threshold for a sealed source.**

Thomas A. Schumacher

Thomas A. Schumacher, M.S., CHP
Certified Health Physicist, American Board of Health Physics

RADIATION PHYSICS CONSULTING
7022 WARWICK ROAD INDIANAPOLIS, IN 46220-1051
VOICE & FAX (317) 251-0193 PAGER (317) 310-4327 CELL (317) 902-9868

Leak Test Certification

Report Date: September 23, 2007.

Facility:	Roche Diagnostics 9115 Hague Road P.O. Box 50457 Indianapolis, IN 46250-0457
Equipment:	NDC Systems Model: 102 **s/n 3721**
Source No.	1466 LQ
Radionuclide	Americium-241
Strength	150 mCi (5.6 GBq)
Model No.	AMCP6
Date of Wipe Sample	9/4/07

Report Prepared for: Dave Shallenberger, Manufacturing Engineering

---

Testing Method: All accessible areas of the sensor head were wiped with a paper wipe pad.

Analysis: All samples were analyzed for removable alpha radioactivity in a liquid scintillation counter (*Packard Model LS-6000IC*). Efficiency is assumed to be 100% for alpha detection in the liquid scintillation media for radioactivity removed by the paper wipe sample.

Results:	Liquid Scintillation Counter	
Sample No.	Net Region counts per minute	**Activity**
Background	33	
Sensor	224	**0.000102 uCi**
		Minimum Detectable Activity= 0.0000538 uCi

Shutter Check: Performed

Summary: **The leak test demonstrates that the detectable leakage of Americium-241 from the device source is within the 0.005 uCi (185 Bq) threshold for a sealed source.**

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VOICE & FAX (317) 251-0193 PAGER (317) 310-4327 CELL (317) 902-9868

Leak Test Certification

Report Date: July 14, 2008.

Facility:	Roche Diagnostics 9115 Hague Road P.O. Box 50457 Indianapolis, IN 46250-0457
Equipment:	NDC Systems Model: 102 **s/n 3720**
Source No.	1466 LQ
Radionuclide	Americium-241
Strength	150 mCi (5.6 GBq)
Model No.	AMCP6
Date of Wipe Sample	7/14/08

Testing Method: All accessible areas of the sensor head were wiped with a moistened paper wipe pad.

Analysis: All samples were analyzed for removable alpha radioactivity in a liquid scintillation counter (*Packard Model LS-6000IC*). Efficiency is assumed to be 100% for alpha detection in the liquid scintillation media for radioactivity removed by the paper wipe sample.

Results:	Liquid Scintillation Counter	
Sample No.	Net Region counts per minute	**Activity**
Background	36	
Sensor	1360	**0.000613 uCi**
		Minimum Detectable Activity= 0.0000082 uCi

Summary: **The leak test demonstrates that the detectable leakage of Americium-241 from the device source is within the 0.005 uCi (185 Bq) threshold for a sealed source.**

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Leak Test Certification

Report Date: July 14, 2008.

Facility:	Roche Diagnostics 9115 Hague Road P.O. Box 50457 Indianapolis, IN 46250-0457
Equipment:	NDC Systems Model: 102 **s/n 3721**
Source No.	1466 LQ
Radionuclide	Americium-241
Strength	150 mCi (5.6 GBq)
Model No.	AMCP6
Date of Wipe Sample	7/14/08

Testing Method: All accessible areas of the sensor head were wiped with a moistened paper wipe pad.

Analysis: All samples were analyzed for removable alpha radioactivity in a liquid scintillation counter (*Packard Model LS-6000IC*). Efficiency is assumed to be 100% for alpha detection in the liquid scintillation media for radioactivity removed by the paper wipe sample.

Results:	Liquid Scintillation Counter	
Sample No.	Net Region counts per minute	**Activity**
Background	36	
Sensor	1360	**0.000613 uCi**
		Minimum Detectable Activity= 0.0000082 uCi

Summary: **The leak test demonstrates that the detectable leakage of Americium-241 from the device source is within the 0.005 uCi (185 Bq) threshold for a sealed source.**

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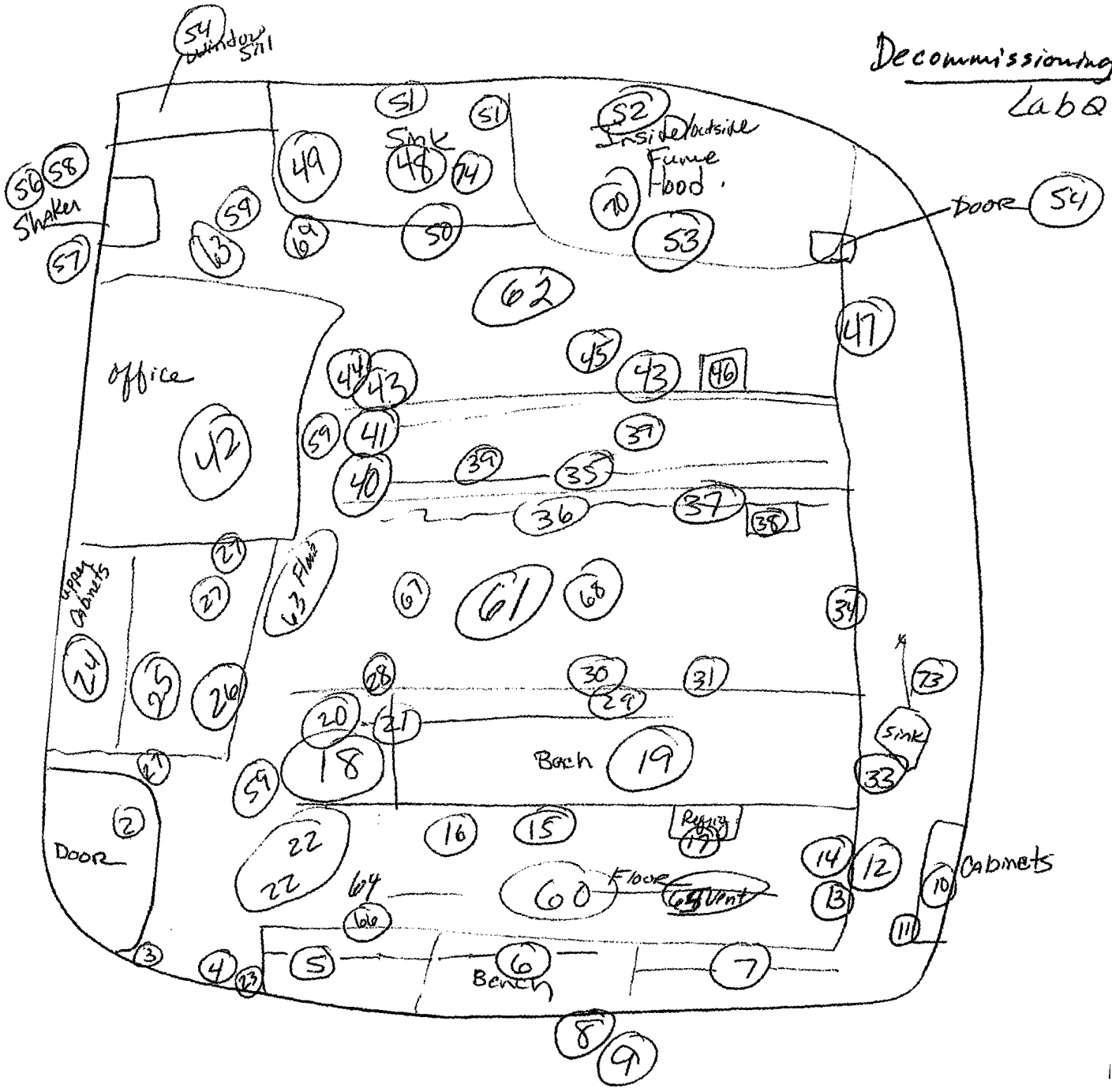
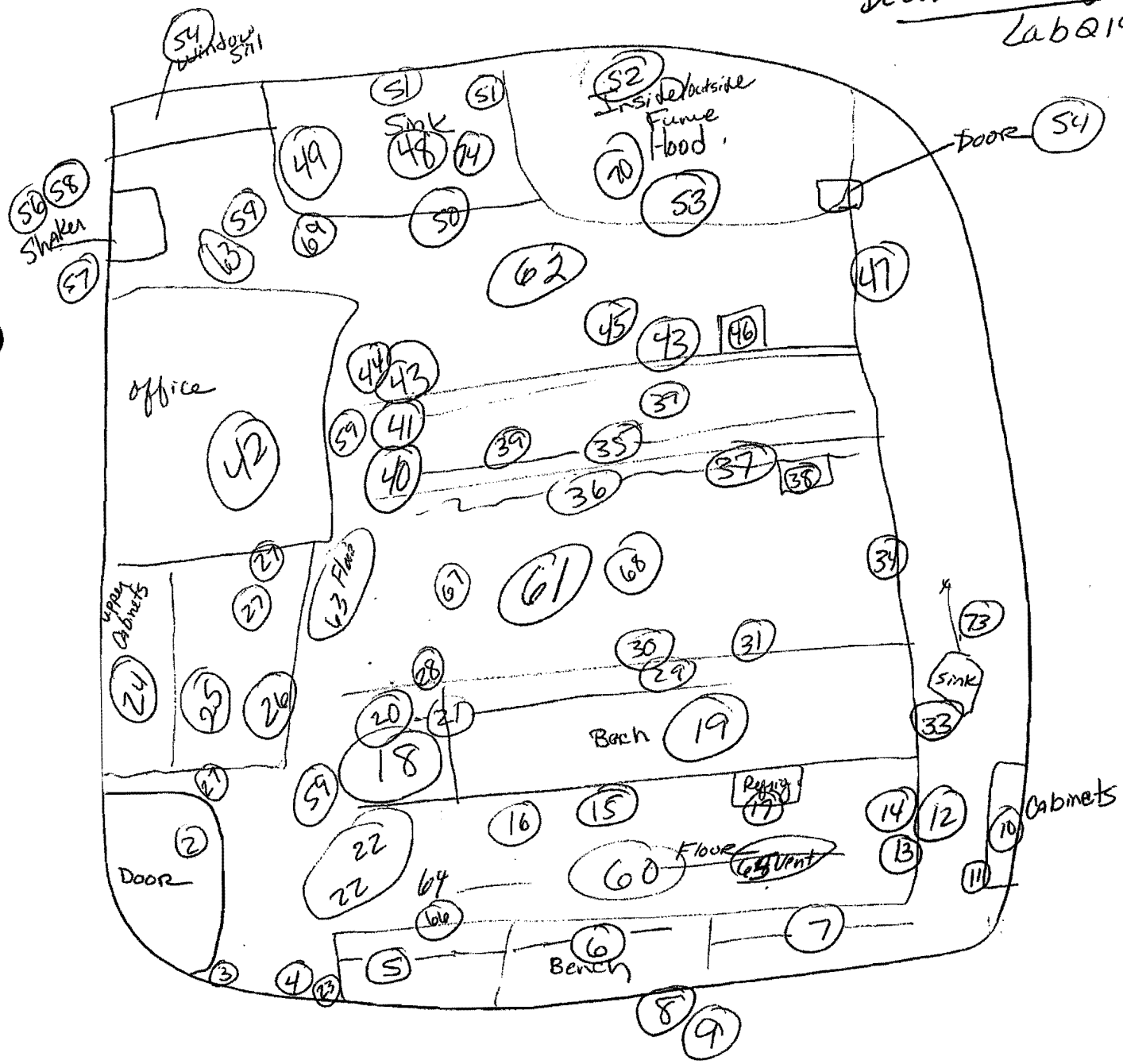

Decommissioning
Lab 219
Window Sill
Sink
Inside/Outside Fume Hood
Door
Shaker
Office
Upper Cabinets
Fume Hood
Bench
Sink
Door
Floor Vent
Cabinets
Bench

Decommissioning
Lab Q19



73. Sink 219 (~~Back~~ side of Lab by Cabinets)

74. Sink 219 (BACK of Lab by Hood)

1.) Control
2.) Front & Back Door Knob
3.) Light switch & wall
4.) Eyewash & Fire Blanket
5.) Bench
6.) Bench
7.) Bench
8.) shelf bottom
9.) Shelf top
10.) Front cabinets
11.) Inside cabinets
12.) Bench top
13.) Lower Cabinets outside
14.) Inside Draws
15.) Outside Cabinets
16.) Inside Cabinets
17.) Inside Refrigerators
18.) Inside/Outside Desk Draws

19.) Bench top
20.) Desk top
21.) Shelves
22.) 2 chairs
23.) Screen & Fire Ext.
24.) Inside & Outside Upper Cabinets
25.) Bench Top
26.) Draws inside & Out
27.) First Aid Kit, Computer, Board
28.) Desk outside & Inside
29.) Bench Top
30.) Draws
31.) Draws
32.) Refrigerators
33.) Sink Top & Inside
34.) Cabinets inside & out
35.) Bench Top
36.) Draws Inside & Out

37.) Draws Inside & Out
38.) Refrigerator
39.) Phone Small Sink
40.) Draws & Desk
41.) Shelves
42.) Office Door Knob/Door/Window/Wall computer
43.) Desk top / Bench top
44.) Desk Draws Bench Draws inside & outside
45.) Bench Draws Draws Middle
46.) Refrigerator
47.) Cabinets inside outside & Ledge
48.) Sink inside / Bench Top / Plexiglass shield
49.) Front & inside Draws Plexiglass
50.) Draws Near Hood
51.) Peg board / Shelf / Paper towels
52.) Fume Hood outside inside
53.) Inside Cabinet Outsided & under Fume hood
54.) Door / Window sill Inside & outside

55.) Electrical / Box & Blinds Gas Carrier
56.) Outside shaker
57.) Auto Rad Cassette
58.) Inside shaker
59.) Waste Basket & Recyc. Hanging Wire
60.) Floor
61.) Middle section Floor
62.) Floor by Fume hood
63.) Floor Center gasket sitting
64.) Vent
65.) Vent
66.) Spill Kits
67.) Vent
68.) Vent
69.) Return
70.) Vents over Fume hood
71.) Lips of Bench
72.) Sink 220

Lab 219 Recommissioning

Protocol #: 8 12 OCT 00 15:57
Time = 5.00
Radionuclide: MANUAL
Region A: LL-UL= .0- 12.0 Bkg= .00 %2 Sigma= .00 Div(K)=1.00 Lcr= 0
Region B: LL-UL= 12.0-156.0 Bkg= .00 %2 Sigma= .00 Div(K)=1.00 Lcr= 0
Region C: LL-UL=156.0- 2000 Bkg= .00
QIP = tSIE

PID	S#	TIME	CPMA/K	2S%A	CPMB/K	2S%B	CPMC	SIS	tSIE	FLAG
21	1	10.00	10.50	19.52	11.90	18.33	11.30	95.526	522	B
21	2	5.00	.70	518.24	.00	.00	2.10	.000	509	
21	3	5.00	.00	.00	.00	.00	1.70	329.02	519	
21	4	5.00	.70	518.24	.00	.00	2.50	350.53	518	
21	5	5.00	1.70	219.78	.00	.00	2.30	.000	508	
21	6	5.00	3.50	112.12	2.10	190.24	.00	14.216	515	
21	7	5.00	4.50	89.44	.70	550.32	.00	.000	484	
21	8	5.00	.00	.00	.00	.00	.00	50.858	475	
21	9	5.00	.50	721.11	.00	.00	.00	.000	486	
21	10	5.00	.00	.00	2.30	174.56	1.10	35.310	513	
21	11	5.00	4.90	82.95	3.30	124.65	.00	87.923	516	
21	12	5.00	4.30	93.14	3.10	132.06	2.10	50.666	462	
29	13	5.00	1.50	247.66	1.10	353.96	1.30	78.768	505	
29	14	5.00	1.30	284.09	.70	550.32	.00	.000	470	
29	15	5.00	2.50	152.84	1.70	232.63	.90	24.992	515	
29	16	5.00	8.10	53.93	3.90	106.96	1.90	87.847	491	
29	17	5.00	3.30	118.30	4.30	97.90	.90	120.67	512	
29	18	5.00	2.30	165.22	3.90	106.96	.30	125.76	500	
29	19	5.00	2.50	152.84	3.30	124.65	4.10	102.99	488	
29	20	5.00	.30	1194.4	1.10	353.96	.50	68.556	475	
29	21	5.00	.00	.00	.00	.00	.70	56.299	461	
29	22	5.00	.00	.00	.70	550.32	1.10	.000	514	
29	23	5.00	.00	.00	3.30	124.65	1.10	144.33	490	
29	24	5.00	.00	.00	.00	.00	.00	116.30	504	
19	25	5.00	80.10	10.93	.00	.00	4.90	.000	463	
19	26	5.00	.00	.00	3.70	112.22	1.50	75.813	490	
19	27	5.00	3.90	101.66	2.50	161.39	.50	.502	496	
19	28	5.00	2.50	152.84	3.10	132.06	3.70	39.781	469	
19	29	5.00	4.50	89.44	1.30	301.08	1.50	39.239	471	
19	30	5.00	.00	.00	1.90	209.21	.30	.000	500	
19	31	5.00	3.30	118.30	1.50	262.30	1.50	.000	505	
19	32	5.00	2.30	165.22	.00	.00	.00	.000	520	
19	33	5.00	1.10	333.77	.50	766.29	2.30	161.70	491	
19	34	5.00	.00	.00	2.70	150.17	3.50	261.61	453	
19	35	5.00	.00	.00	1.90	209.21	.00	.000	421	
19	36	5.00	3.10	125.27	1.30	301.08	1.30	29.960	496	
23	37	5.00	.70	518.24	3.90	106.96	1.10	112.28	494	
23	38	5.00	2.50	152.84	.00	.00	.00	.000	507	
23	39	5.00	.50	721.11	.70	550.32	3.30	142.04	491	
23	40	5.00	.00	.00	.00	.00	.00	50.558	427	
23	41	5.00	1.90	197.77	.00	.00	.00	.000	466	
23	42	5.00	.00	.00	.50	766.29	1.90	******	504	
23	43	5.00	7.10	60.22	.00	.00	.90	.000	381	
23	44	5.00	.00	.00	1.30	301.08	4.30	630.76	494	
23	45	5.00	.00	.00	1.90	209.21	.00	190.99	491	
23	46	5.00	1.10	333.77	.50	766.29	4.50	.000	509	
23	47	5.00	4.30	93.14	2.50	161.39	.70	46.687	506	

PID	S#	TIME	CPMA/K	2SZA	CPMB/K	2SZB	CPMC	SIS	tSIE	FLAG
23	48	5.00	1.10	333.77	1.30	301.08	.10	103.92	479	
30	49	5.00	.00	.00	1.50	262.30	2.30	107.53	479	
30	50	5.00	1.30	284.09	4.30	97.90	.10	83.345	458	
30	51	5.00	.00	.00	2.90	140.49	1.10	1190.9	504	
30	52	5.00	.00	.00	.70	550.32	2.50	.000	436	
30	53	5.00	3.50	112.12	.00	.00	2.10	.000	439	
30	54	5.00	2.30	165.22	1.70	232.63	.90	.000	402	
30	55	5.00	1.30	284.09	.90	430.33	.00	.000	471	
30	56	5.00	3.10	125.27	3.70	112.22	2.90	63.908	491	
30	57	5.00	2.10	179.95	1.30	301.08	6.10	68.921	508	
30	58	5.00	1.10	333.77	1.50	262.30	2.70	35.187	489	
30	59	5.00	2.70	142.29	6.70	66.14	.00	89.743	478	
30	60	5.00	5.90	70.54	2.10	190.24	.00	29.960	443	
26	61	5.00	.00	.00	.00	.00	.00	42.841	433	
26	62	5.00	.00	.00	1.50	262.30	1.50	699.77	425	
26	63	5.00	.00	.00	.90	430.33	2.30	129.40	426	
26	64	5.00	.00	.00	4.70	90.37	2.70	149.17	493	
26	65	5.00	.90	405.52	.30	1270.1	1.50	163.44	504	
26	66	5.00	.00	.00	2.70	150.17	3.70	501.21	501	
26	67	5.00	.00	.00	3.70	112.22	.00	583.19	461	
26	68	5.00	2.90	133.19	2.10	190.24	2.50	.000	449	
26	69	5.00	2.70	142.29	2.10	190.24	4.30	77.040	386	
26	70	5.00	.00	.00	3.90	106.96	2.10	187.48	400	
26	71	5.00	1.10	333.77	.30	1270.1	1.30	73.371	502	
26	72	5.00	.50	721.11	.30	1270.1	.10	.000	490	
10	73	5.00	1.50	247.66	.30	1270.1	.70	4.280	429	
10	74	5.00	1.10	333.77	4.90	87.06	.50	53.821	495	
10	75	5.00	2.10	179.95	.00	.00	.70	841.82	525	

SYSTEM NORMALIZED
SYSTEM NORMALIZED
SYSTEM NORMALIZED
SYSTEM NORMALIZED
SYSTEM NORMALIZED
SYSTEM NORMALIZED
SYSTEM NORMALIZED
SYSTEM NORMALIZED

Lab-219

Protocol #: 2 13 OCT 00 16:17
Time = 5.00
Radionuclide: C14
Region A: LL-UL= .0-156.0 Bkg= .00 %2 Sigma= .00 Div(K)=1.00 Lcr= 0
Region B: LL-UL= 4.0-156.0 Bkg= .00 %2 Sigma= .00 Div(K)=1.00 Lcr= 0

QIP = tSIE

PID	S#	TIME	CPMA/K	CPMB/K	SIS	tSIE	FLAG
5	1	5.00	98641.7	95557.7	159.89	1001	
5	1	5.00	98507.9	95439.1	159.42	1002	
5	1	5.00	98286.5	95208.1	159.50	996	
			98478.7	95401.7	159.60	1000	A

98641
98507
98478

$3\overline{)295526}$
98508

$$\frac{98,\cancel{528}\ 542}{102100} \times 100 = 96.4\%$$

over min accep 96.5%

Exhaust Fan #51 Roof

Protocol #: 8 02 NOV 00 14:32
Time = 5.00
Radionuclide: MANUAL
Region A: LL-UL= .0- 12.0 Bkg= .00 %2 Sigma= .00 Div(K)=1.00 Lcr= 0
Region B: LL-UL= 12.0-156.0 Bkg= .00 %2 Sigma= .00 Div(K)=1.00 Lcr= 0
Region C: LL-UL=156.0- 2000 Bkg= .00
QIP = tSIE

PID	S#	TIME	CPMA/K	2S%A	CPMB/K	2S%B	CPMC	SIG	tSIE	FLAG
30	1	10.00	24.40	12.80	17.90	14.95	13.30	78.478	482	0
30	2	5.00	.00	.00	.00	.00	1.10	80.154	398	
30	3	5.00	.00	.00	.00	.00	.10	89.495	494	
30	4	5.00	.00	.00	.00	.00	.00	95.928	446	

SYSTEM NORMALIZED

Neg Control
#79 exhaust Fan #51 Stack flat part
#80 exhaust Fan #5- Stack hole
Neg Control other test

all OK

C14 Efficiency
102,100 DPM

Protocol #: 2 02 NOV 00 15:45
Time = 5.00
Radionuclide: C14
Region A: LL-UL= .0-156.0 Bkg= .00 %2 Sigma= .00 Div(K)=1.00 Lcr= 0
Region B: LL-UL= 4.0-156.0 Bkg= .00 %2 Sigma= .00 Div(K)=1.00 Lcr= 0
Region C: LL-UL= .0- .0 Bkg= .00
QIP = tSIE

PID	S#	TIME	CPMA/K	CPMB/K	SIS	tSIE	FLAG
	WARNING: NOT NORMALIZED						
5	1	5.00	98602.5	95456.7	158.98	995	
5	1	5.00	98549.1	95461.1	158.78	1002	
5	1	5.00	98559.1	95465.1	158.89	999	
			98570.3	95461.0	158.88	999	A

$\frac{98570.3}{102,100\ DPM} \times 100 = 96.5\%$ efficiency

Radiation Physics Consulting
Since 1988

7022 Warwick Road
Indianapolis, IN 46220-1635
(317) 251-0193
pager 212-2042
tschu@hotmail.com

February 28, 2001

Roche Diagnostics
9115 Hague Road
Indianapolis, IN 46256

Attn: Jeanne Steinfeld, Assistant Radiation Safety Officer

Dear Ms. Steinfeld:

Thank you for the opportunity to assist with your January 31, 2001 characterization and radiation surveys of laboratory wastes in the Roche research building.

We surveyed all areas of a former waste room, and the waste drums within it, with a Berthold LB-122 surface contamination detector. This detector has excellent response to both low and high-energy beta and gamma radiation. The Berthold sees any contamination besides tritium (H-3) down to very low levels.

We removed each drum from the room and screen-surveyed the bagged contents. After finding nothing above background radiation levels, we sent the contents of the drums marked "P-32" (14.3-day half-life) by the waste originators to the normal trash stream.

Several bags were labeled as containing tritium-containing waste, with the 12.6-year half-life. We segregated these bags, and the drums that contained them, for wipe surveys to be assayed in a liquid scintillation counter.

It may be possible to dispose, as regular trash, small quantities of tritium from "generally-licensed" research kits. However, the radiation regulatory authorities prefer that you combine such wastes with that higher-activity waste from radioactive materials you produce from shipments obtained under your NRC byproduct materials license. If,

after scintillation counting, the samples show tritium residues, we recommend that you hold this waste for commercial disposal.

The Nuclear Regulatory Commission (NRC), in its 10 CFR Part 30 requirements, requires that you maintain records of all areas in which you used byproduct materials. This relates to the "decommissioning" requirements for final building disposition. If you remodel this waste area, please note the following and keep in a separate file the following items and records in your license files (*from 10 CFR 30.35.g*):

(1) Records of spills or other unusual occurrences involving the spread of contamination in and around the facility, equipment, or site. These records may be limited to instances when contamination remains after any cleanup procedures or when there is reasonable likelihood that contaminants may have spread to inaccessible areas as in the case of possible seepage into porous materials such as concrete. These records must include any known information on identification of involved nuclides, quantities, forms, and concentrations.

(2) As-built drawings and modifications of structures and equipment in restricted areas where radioactive materials are used and/or stored, and of locations of possible inaccessible contamination such as buried pipes that may be subject to contamination. If required drawings are referenced, each relevant document need not be indexed individually. If drawings are not available, the licensee shall substitute appropriate records of available information concerning these areas and locations.

(3) Except for areas containing only sealed sources (provided the sources have not leaked or no contamination remains after any leak) or byproduct materials having only half-lives of less than 65 days, a list contained in a single document and updated every 2 years, of the following:

(i) All areas designated and formerly designated restricted areas as defined in 10 CFR 20.1003 (For requirements prior to January 1, 1994, see 10 CFR 20.3 as contained in the CFR edition revised as of January 1, 1993.);

(ii) All areas outside of restricted areas that require documentation under §30.35(g)(1).

(iii) All areas outside of restricted areas where current and previous wastes have been buried as documented under 10 CFR 20.2108; and

(iv) All areas outside of restricted areas that contain material such that, if the license expired, the licensee would be required to either decontaminate the area to meet the criteria for decommissioning in 10 CFR part 20, subpart E, or apply for

approval for disposal under 10 CFR 20.2002.

(4) Records of the cost estimate performed for the decommissioning funding plan or of the amount certified for decommissioning, and records of the funding method used for assuring funds if either a funding plan or certification is used.

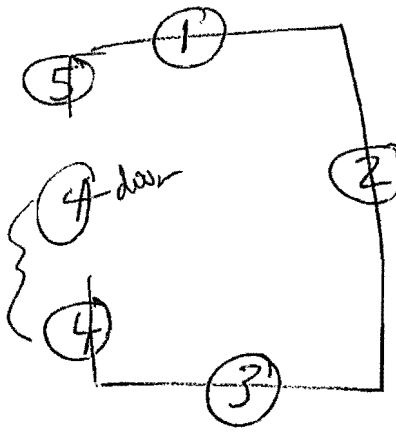
NRC inspectors may ask for such a file characterizing past uses and spaces as noted above. Documents that outline radiation uses in key areas are of great value for showing compliance.

It was a pleasure to be of help. If you have any questions, feel free to call or e-mail us.

Sincerely,

Thomas A. Schumacher
Certified Health Physicist
American Board of Health Physics

#1 wall
2 "
3 "
4 "
5 "
6 outside of door
7 geiger counter
8 floor
9 microcentrifuge (floor) #08028
10 microcentrifuge (on scint counter) #08132
11 scint. counter (lid - outside)
12 scint counter inside
13 Plexiglas + funnel (for liquid waste)
14 Steel waste can "^{3}H only" - outside



decontamination 2/6/01

LEGEND for swipe (methanol swipe)

2/8/01

Jeanne,

I'm assuming these are the counts?? Just what are we to do with these vials? Cathy Hoover

Protocol #: 8 07 FEB 01 16:13
Time = 5.00
Radionuclide: MANUAL
Region A: LL-UL= .0- 12.0 Bkg= .00 %2 Sigma= .00 Div(K)=1.00 Lcr= 0
Region B: LL-UL= 12.0-156.0 Bkg= .00 %2 Sigma= .00 Div(K)=1.00 Lcr= 0
Region C: LL-UL=156.0- 2000 Bkg= .00
QIP = tSIE

PID	S#	TIME	CPMA/K	2S%A	CPMB/K	2S%B	CPMC	SIS	tSIE	FLAG
5	1	10.00	10.30	19.71	11.00	19.07	10.10	85.291	457	B
5	2	5.00	.00	.00	.80	465.03	.50	.000	441	
5	3	5.00	14.10	34.48	3.00	131.66	.50	25.070	442	
5	4	5.00	.50	714.42	2.60	150.34	2.30	145.74	439	
5	5	5.00	.00	.00	.00	.00	.00	78.798	445	
5	6	5.00	.00	.00	.00	.00	.00	73.789	459	
5	7	5.00	.00	.00	1.40	270.30	1.90	705.66	463	
5	8	5.00	.00	.00	2.20	175.81	1.30	49.756	432	
5	9	5.00	.00	.00	.40	919.24	.90	.000	359	
5	10	5.00	.00	.00	1.20	313.58	.00	.000	440	
5	11	5.00	.00	.00	.00	.00	.10	.000	457	
5	12	5.00	1.10	330.79	1.00	374.17	.00	80.785	394	
30	13	5.00	.00	.00	2.20	175.81	1.30	283.62	436	
30	14	5.00	.00	.00	1.40	270.30	.50	.000	380	
30	15	5.00	.00	.00	1.80	212.57	.00	.000	402	

^: LL-UL= .0- 18.6 Bkg= .00 %2 Sigma= .00 Div(K)=1.00 Lcr= 0
Region B: LL-UL= 18.0-156.0 Bkg= .00 %2 Sigma= .00 Div(K)=1.00 Lcr= 0
Region C: LL-UL=156.0- 2000 Bkg= .00
QIP = tSIE

S#	TIME	CPMA/K	CPMB/K	CPMC	SIS	tSIE
1	10.00	10.30	11.20	9.80	109.90	472
1	10.00	10.90	12.60	10.30	105.36	476
1	10.00	12.80	10.80	11.80	89.559	478
		11.33	11.53	10.63	101.61	475
2	10.00	13.20	10.30	10.30	101.63	459
2	10.00	14.80	7.90	11.50	77.678	458
2	10.00	13.70	10.10	10.20	86.540	458
		13.90	9.43	10.67	88.617	458
3	10.00	11.40	8.70	10.80	93.026	448
3	10.00	12.20	8.30	8.50	95.018	448
3	10.00	12.60	8.50	11.30	88.912	447
		12.07	8.50	10.20	92.319	447
4	10.00	13.50	9.80	12.60	99.538	440
4	10.00	12.80	10.00	10.30	94.467	438
4	10.00	11.10	10.80	10.30	101.33	439
		12.47	10.20	11.07	98.447	439
5	10.00	13.60	9.80	10.30	94.530	451
5	10.00	11.20	10.20	11.10	101.51	452

#3 Efficiency Cal 64%

```
Protocol #: 3            19 FEB 01   17:16
Time =  1.00
Radionuclide: H3
Region A: LL-UL=   .0- 18.6  Bkg=   .00  %2 Sigma= .00  Div(K)=1.00  Lcr=    0
Region B: LL-UL=  2.0- 18.6  Bkg=   .00  %2 Sigma= .00  Div(K)=1.00  Lcr=    0
Region C: LL-UL=   .0-   .0  Bkg=   .00
QIP = SIS

PID    S#     TIME    CPMA/K    CPMB/K      SIS  FLAG
 31     1     1.00  80713.0   72104.0   19.476
SYSTEM NORMALIZED
```

#3 Check

Protocol #: 3 19 FEB 01 17:25
Time = 1.00
Radionuclide: H3
Region A: LL-UL= .0- 18.6 Bkg= .00 %2 Sigma= .00 Div(K)=1.00 Lcr= 0
Region B: LL-UL= 2.0- 18.6 Bkg= .00 %2 Sigma= .00 Div(K)=1.00 Lcr= 0
Region C: LL-UL= .0- .0 Bkg= .00
QIP = SIS

PID	S#	TIME	CPMA/K	CPMB/K	SIS	FLAG
31	1	1.00	81028.0	72217.0	19.435	

Protocol #: 3 19 FEB 01 17:27
Time = 1.00
Radionuclide: H3
Region A: LL-UL= .0- 18.6 Bkg= .00 %2 Sigma= .00 Div(K)=1.00 Lcr= 0
Region B: LL-UL= 2.0- 18.6 Bkg= .00 %2 Sigma= .00 Div(K)=1.00 Lcr= 0
Region C: LL-UL= .0- .0 Bkg= .00
QIP = SIS

PID	S#	TIME	CPMA/K	CPMB/K	SIS	FLAG
31	1	1.00	81200.0	72403.0	19.436	

C-14 efficiency

Protocol #: 2 07 FEB 01 15:49
Time = 5.00
Radionuclide: C14
Region A: LL-UL= .0-156.0 Bkg= .00 %2 Sigma= .00 Div(K)=1.00 Lcr= 0
Region B: LL-UL= 4.0-156.0 Bkg= .00 %2 Sigma= .00 Div(K)=1.00 Lcr= 0
Region C: LL-UL= .0- .0 Bkg= .00
QIP = tSIE

PID	S#	TIME	CPMA/K	CPMB/K	SIS	tSIE	FLAG
34	1	5.00	98235.3	95207.1	160.23	998	
34	1	5.00	98531.9	95504.1	159.96	997	
34	1	5.00	98321.7	95268.1	159.85	999	
			98363.0	95326.5	160.02	998	A

$$\frac{98363}{102,100} \times 100 = 96.8\%$$

98077.0 95052.9 160.19 1003 A

1-800-445-7426

Serial # 100448
1500 Tri Carb

H-3 Efficiency

```
Protocol #: 3              07 FEB 01  15:04
Time =  1.00
Radionuclide: H3
Region A: LL-UL=   .0- 18.6  Bkg=  .00  %2 Sigma= .00  Div(K)=1.00  Lcr=   0
Region B: LL-UL=  2.0- 18.6  Bkg=  .00  %2 Sigma= .00  Div(K)=1.00  Lcr=   0
Region C: LL-UL=   .0-   .0  Bkg=  .00
QIP = SIS

PID    S#     TIME   CPMA/K   CPMB/K     SIS  FLAG
 Xt     1     1.00  80654.0  72024.0  19.506
```

$\frac{80,654}{253,700} \times 100 = 31.77\%$

4 ml 4 26,000 DPM = 0.4%

C-Mexico

98036.9
98117.1

$$\frac{98117.1}{102,100} = 96.$$

DISPENSERS OPTICAL SERVICE

H3 Waste

1 TOP

Sonoco hevaPak
M-5503-E >X
Shipping test 90 lbs
Net wt 400
Tritium waste Bag from Pitchel
1 = TOP
2 = ~~Bag~~ Pipette
3 = BAg.
4 = Inside / outside Container

Tulin with BMB Beverly
sent to R+D 2/20/01

Protocol #:10 19 FEB 01 17:41
Time = 1.00
Radionuclide: H3
Region A: LL-UL= .0- 18.6 Bkg= .00 %2 Sigma= .00 Div(K)=1.00 Lcr= 0
Region B: LL-UL= 2.0- 18.6 Bkg= .00 %2 Sigma= .00 Div(K)=1.00 Lcr= 0
Region C: LL-UL= .0- .0 Bkg= .00
QIP = SIS

PID	S#	TIME	CPMA/K	CPMB/K	SIS	FLAG
5	1	1.00	25.00	17.00	22.149	
5	2	1.00	15.00	12.00	16.692	
5	3	1.00	18.00	14.00	12.929	
5	4	1.00	17.00	14.00	28.512	
5	5	1.00	20.00	16.00	21.908	

Ten perbecity noted in waste
No log attached

Tritium Locate BMB
Cont

Protocol #:10 19 FEB 01 17:48
Time = 1.00
Radionuclide: H3
Region A: LL-UL= .0- 18.6 Bkg= .00 %2 Sigma= .00 Div(K)=1.00 Lcr= 0
Region B: LL-UL= 2.0- 18.6 Bkg= .00 %2 Sigma= .00 Div(K)=1.00 Lcr= 0
Region C: LL-UL= .0- .0 Bkg= .00
QIP = SIS

PID	S#	TIME	CPMA/K	CPMB/K	SIS	FLAG
5	1	1.00	20.00	17.00	22.390	
5	2	1.00	23.00	20.00	21.912	
5	3	1.00	35.00	26.00	13.482	
5	4	1.00	15.00	12.00	23.861	
5	5	1.00	17.00	16.00	29.456	

Cont

Tritium Waste
metal container BMB Building

Protocol #:10 19 FEB 01 17:55
Time = 1.00
Radionuclide: H3
Region A: LL-UL= .0- 18.6 Bkg= .00 %2 Sigma= .00 Div(K)=1.00 Lcr= 0
Region B: LL-UL= 2.0- 18.6 Bkg= .00 %2 Sigma= .00 Div(K)=1.00 Lcr= 0
Region C: LL-UL= .0- .0 Bkg= .00
QIP = SIS

PID	S#	TIME	CPMA/K	CPMB/K	SIS	FLAG
5	1	1.00	15.00	9.00	19.153	
5	2	1.00	17.00	12.00	23.414	
5	3	1.00	33.00	25.00	21.303	
5	4	1.00	12.00	8.00	20.062	
5	5	1.00	11.00	9.00	27.139	

Tritium wipe
BMB Bueker
Cont

Protocol #:10 19 FEB 01 18:02
Time = 1.00
Radionuclide: H3
Region A: LL-UL= .0- 18.6 Bkg= .00 %2 Sigma= .00 Div(K)=1.00 Lcr= 0
Region B: LL-UL= 2.0- 18.6 Bkg= .00 %2 Sigma= .00 Div(K)=1.00 Lcr= 0
Region C: LL-UL= .0- .0 Bkg= .00
QIP = SIS

PID	S#	TIME	CPMA/K	CPMB/K	SIS	FLAG
5	1	1.00	18.00	13.00	28.801	
5	2	1.00	25.00	17.00	17.591	
5	3	1.00	29.00	22.00	21.418	
5	4	1.00	15.00	12.00	29.960	
5	5	1.00	13.00	11.00	21.112	

Tritium Water BMB cont.

Protocol #:10 19 FEB 01 18:09
Time = 1.00
Radionuclide: H3
Region A: LL-UL= .0- 18.6 Bkg= .00 %2 Sigma= .00 Div(K)=1.00 Lcr= 0
Region B: LL-UL= 2.0- 18.6 Bkg= .00 %2 Sigma= .00 Div(K)=1.00 Lcr= 0
Region C: LL-UL= .0- .0 Bkg= .00
QIP = SIS

PID	S#	TIME	CPMA/K	CPMB/K	SIS	FLAG
5	1	1.00	21.00	16.00	23.834	
5	2	1.00	29.00	20.00	19.031	
5	3	1.00	40.00	32.00	17.243	
5	4	1.00	19.00	19.00	24.497	
5	5	1.00	11.00	10.00	23.637	

To Jeanne - 6680
from Jody Albertson.

Left Cabinet – top shelf
1 = tray
2 = tray lid
3 = inside tray
4 = outside bottle
5 = inside bottle
6 = outside of Xylene bottle
7 = outside of Xylene bottle
8 = top of rack
9 = bottom of rack
10 = lid of Rad-Con can
11 = lid of Rad-Con can

Left Cabinet – bottom shelf
12 = outside of lead pig
13 = outside of lead pig
14 = outside of lead pig
15 = outside of lead pig
16 = outside of lead pig
17 = outside of lead pig
18 = outside of lead pig
19 = inside of lead pig
20 = inside of lead pig
21 = inside of lead pig
22 = inside of lead pig
23 = inside of lead pig
24 = inside of lead pig
25 = inside of lead pig

Right Cabinet – top shelf
26 = outside of bag
27 = outside of bag
28 = inside of bag
29 = inside of bag
30 = top of rack
31 = bottom of rack
32 = top of rack
33 = bottom of rack
34 = rack
35 = rack
36 = rack
37 = rack
38 = rack
39 = rack
40 = rack

Right Cabinet – bottom shelf
41 = tray lid
42 = inside of tray
43 = bottom of tray
44 = gloves
45 = outside of plastic vial
46 = outside of plastic vial
47 = inside of plastic vial
48 = inside of plastic vial

49 = cabinet – back (right)
50 = cabinet – back (left)
51 = cabinet -- shelf (right)
52 = cabinet -- shelf (left)

The key below was for the first set of samples!

L1 = top left shelf
L2 = bottom left shelf
L3 = cabinet doors – left

R1 = top right shelf
R2 = bottom right shelf
R3 = cabinet doors -- right

Protocol #: 1 25 OCT 01 13:18
Time = 1.00
Radionuclide: C14
Region A: LL-UL= .0-156.0 Bkg= .00 %2 Sigma= .00 Div(K)=1.00 Lcr= 0
Region B: LL-UL= 4.0-156.0 Bkg= .00 %2 Sigma= .00 Div(K)=1.00 Lcr= 0
Region C: LL-UL= .0- .0 Bkg= .00
!IP = tSIE

PID	S#	TIME	CPMA/K	CPMB/K	SIS	tSIE	FLAG
2	1	1.00	97888.0	94879.0	159.89	1003	
2	1	1.00	97753.0	94855.0	159.88	995	
2	1	1.00	98269.0	95325.0	159.97	1001	
			97970.0	95019.6	159.92	1000	A

Protocol #: 5 25 OCT 01 13:32
Time = 5.00
Radionuclide: MANUAL
Region A: LL-UL= .0- 12.0 Bkg= .00 %2 Sigma= .00 Div(K)=1.00 Lcr= 0
Region B: LL-UL= 12.0-156.0 Bkg= .00 %2 Sigma= .00 Div(K)=1.00 Lcr= 0
Region C: LL-UL=156.0- 2000 Bkg= .00
IP = tSIE

PID	S#	TIME	CPMA/K	2S%A	CPMB/K	2S%B	CPMC	SIS	tSIE	FLAG
34	1	0.00	8.20	22.09	14.50	16.61	10.50	101.70	659	B
34	2	5.00	314.20	5.14	10.50	48.37	.00	9.707	645	
34	3	5.00	7.20	54.86	.00	.00	2.90	.000	622	
34	4	5.00	1.00	326.19	.70	605.42	.00	188.25	636	
34	5	5.00	4.20	86.50	.00	.00	.00	.000	628	
34	6	5.00	2.20	154.81	.00	.00	1.30	.000	632	
34	7	5.00	3.40	104.24	.00	.00	.30	.000	647	
34	8	5.00	4.00	90.28	.50	843.80	1.50	48.971	652	
34	9	5.00	1.60	208.42	.00	.00	.00	.000	666	
34	10	5.00	17.80	27.57	.00	.00	.10	.855	660	
34	11	5.00	64.20	12.19	2.10	208.00	.90	9.698	654	
34	12	5.00	8.40	48.45	.00	.00	1.50	.000	654	
14	13	5.00	.00	.00	.30	1399.9	.30	.000	642	
14	14	5.00	3.80	94.44	1.10	388.68	.00	60.597	669	
14	15	5.00	19.60	25.77	1.50	287.52	1.10	13.905	664	
14	16	5.00	1.40	236.47	2.30	190.71	1.70	61.449	653	
14	17	5.00	2.20	154.81	2.10	208.00	.00	72.337	649	
14	18	5.00	3.40	104.24	1.30	330.32	.10	6.147	657	
14	19	5.00	.00	******	.00	.00	.00	109.34	574	
14	20	5.00	2.20	154.81	.00	.00	.00	.000	643	
14	21	5.00	3.20	110.04	.00	.00	3.10	.000	649	
14	22	5.00	1.40	236.47	.00	.00	.00	85.958	636	
14	23	5.00	1.40	236.47	.00	.00	.00	307.57	665	
14	24	5.00	1.40	236.47	.00	.00	.00	203.51	651	
30	25	5.00	1.00	326.19	.00	.00	.00	370.52	573	
30	26	5.00	.40	796.87	.00	.00	.50	127.75	661	
30	27	5.00	2.00	169.12	.00	.00	.00	1707.7	664	
30	28	5.00	2.00	169.12	.00	.00	.00	975.20	666	
30	29	5.00	.00	.00	.00	.00	.70	.000	667	
30	30	5.00	.00	******	.00	.00	.10	79.697	654	

30	31	5.00	.00	.00	.10	4180.8	.00	.000	630
30	32	5.00	2.80	124.13	.00	.00	.00	75.257	644
30	33	5.00	1.40	236.47	.00	.00	.00	376.45	650
30	34	5.00	.00	.00	.00	.00	1.30	207.15	617
30	35	5.00	1.40	236.47	.00	.00	2.70	.000	655
30	36	5.00	1.40	236.47	.00	.00	1.30	167.23	651
4	37	5.00	.40	796.87	.00	.00	.00	202.91	651
4	38	5.00	.60	535.41	.90	472.97	.10	74.686	624
4	39	5.00	3.80	94.44	.00	.00	.50	.000	652
4	40	5.00	1.00	326.19	.00	.00	.00	26.018	653
4	41	5.00	3.20	110.04	.00	.00	.00	.000	664
4	42	5.00	.00	.00	.00	.00	.00	.000	647
4	43	5.00	.80	404.66	.00	.00	.00	477.22	641
4	44	5.00	.00	.00	.00	.00	.00	182.97	631
4	45	5.00	.00	.00	.30	1399.9	.10	646.50	529
4	46	5.00	.40	796.87	.00	.00	.30	340.07	641
4	47	5.00	.00	.00	.00	.00	.00	38.110	648

PID	S#	TIME	CPMA/K	2S%A	CPMB/K	2S%B	CPMC	SIS	tSIE	FLAG
4	48	5.00	.00	.00	.00	.00	.00	114.91	648	
35	49	5.00	1.20	273.86	.00	.00	.00	590.64	626	
35	50	5.00	1.20	273.86	.00	.00	.00	147.20	658	
35	51	5.00	3.80	94.44	.10	4180.8	.00	.000	653	
35	52	5.00	2.40	142.89	.00	.00	.00	.000	644	
35	53	5.00	.00	******	.00	.00	2.30	225.70	633	
35	54	5.00	46.20	14.81	6.10	77.38	7.10	23.489	645	repeat #53

Closet closeout
R+D closet 219+220

Protocol #: 5 24 OCT 01 16:39
Time = 5.00
Radionuclide: MANUAL
Region A: LL-UL= .0- 12.0 Bkg= .00 %2 Sigma= .00 Div(K)=1.00 Lcr= 0
Region B: LL-UL= 12.0-156.0 Bkg= .00 %2 Sigma= .00 Div(K)=1.00 Lcr= 0
Region C: LL-UL=156.0- 2000 Bkg= .00
QIP = tSIE

PID	S#	TIME	CPMA/K	2S%A	CPMB/K	2S%B	CPMC	SIS	tSIE	FLAG
24	Neg1	10.00	11.70	18.49	14.60	16.55	10.50	92.765	656	B
24	Rout2	5.00	.00	.00	.00	.00	.10	220.68	668	
24	Rout3	5.00	.00	.00	.40	1055.9	.00	67.210	665	
24	L14	5.00	.00	.00	.00	.00	.70	141.50	646	
24	L25	5.00	.00	.00	.60	707.10	.10	.000	631	
24	R16	5.00	.00	.00	.00	.00	.00	99.547	668	
24	R27	5.00	.00	.00	.00	.00	.00	76.782	596	
24	18	5.00	.00	.00	1.60	270.99	.00	.000	670	
24	29	5.00	.00	.00	.60	707.10	2.70	25.091	604	
24	310	5.00	.00	.00	.00	.00	.30	248.64	615	
24	411	5.00	.00	.00	1.20	358.24	2.10	371.55	632	
24	512	5.00	.10	3757.6	.00	.00	.70	113.04	643	
10	613	5.00	.00	.00	.20	2102.3	2.10	566.83	666	
10	714	5.00	.00	.00	2.60	170.28	.50	.000	577	
(1 missing vial)										
10	Cont16	5.00	.00	.00	.00	.00	.00	71.423	616	
10	817	5.00	.00	.00	.00	.00	1.10	.000	598	
10	918	5.00	.00	.00	.00	.00	.10	54.935	593	
10	1019	5.00	.00	.00	.00	.00	.00	72.787	598	
10	11 20	5.00	1.50	260.26	1.20	358.24	1.50	131.17	570	
10	1221	5.00	.00	.00	.00	.00	1.90	44.223	600	

Left Closet R+D 220
1. doorknob inside + out Left
2. Rt wall + left shelf
3. med wall + ceiling
4. Left wall + floor
5. Right closet R+D 219
Right closet inside + out
6. Rt walls
7. med wall + ceiling all over
8. ceiling left closet + floor
9. ceiling right closet + floor
10. floor left Closet
11. floor right closet
12. Containers for benches

SYSTEM NORMALIZED

BMB Lab + Closets in R&D

Normalization

SYSTEM NORMALIZED

Efficiency of C14

5/6 (82/100) = 96.44%

Protocol #: 1 24 OCT 01 14:25
Time = 1.00
Radionuclide: C14
Region A: LL-UL= .0-156.0 Bkg= .00 %2 Sigma= .00 Div(K)=1.00 Lcr= 0
Region B: LL-UL= 4.0-156.0 Bkg= .00 %2 Sigma= .00 Div(K)=1.00 Lcr= 0
Region C: LL-UL= .0- .0 Bkg= .00
QIP = tSIE

PID	S#	TIME	CPMA/K	CPMB/K	SIS	tSIE	FLAG
2	1	1.00	98523.0	95480.0	158.65	995	
2	1	1.00	98424.0	95361.0	158.81	995	
2	1	1.00	98470.0	95359.0	158.50	994	
			98472.3	95400.0	158.66	995	A

Protocol #: 5 24 OCT 01 14:39
Time = 5.00
Radionuclide: MANUAL
Region A: LL-UL= .0- 12.0 Bkg= .00 %2 Sigma= .00 Div(K)=1.00 Lcr= 0
Region B: LL-UL= 12.0-156.0 Bkg= .00 %2 Sigma= .00 Div(K)=1.00 Lcr= 0
Region C: :

	PID	S#	Time	CPM/K	2S%A	CPM/K	2S%B	CAME	SIS	TSIE	Flag
Neg	24	1	10.00	3.60	21.57	2.40	[illegible]	.30	[illegible]	[illegible]	
R	24	2	5.00	.00	413.82	1.40	285.71	.00	182.24	670	
Rout	24	3	5.00	3.00	118.88	2.20	185.42	.00	141.79	663	
[illegible]	24	4	5.00	4.00	91.92	2.20	185.42	.00	41.316	643	
L2	24	5	5.00	1.00	333.47	.80	492.44	2.30	267.85	628	
R1	24	6	5.00	1.00	333.47	.60	653.20	.10	199.22	668	
R2	24	7	5.00	.40	815.47	.00	.00	2.90	1434.8	600	
1	24	8	5.00	3.40	106.21	1.40	285.71	1.90	116.09	671	
2	24	9	5.00	.80	413.82	1.40	285.71	.70	192.30	603	
3	24	10	5.00	1.80	190.52	3.60	117.06	.00	131.43	617	
4	24	11	5.00	2.40	145.77	.00	.00	1.70	174.14	630	
[illegible]	24	12	5.00	1.80	190.52	2.40	170.78	.00	151.25	640	
[illegible]	10	13	5.00	2.00	172.63	2.60	158.39	.30	108.09	666	
7	10	14	5.00	.00	.00	4.20	101.69	.90	238.74	572	
	(1 missing vial)										
Cont	10	16	5.00	.40	815.47	3.40	123.39	.00	190.31	617	
8	10	17	5.00	3.00	118.88	2.00	202.98	.10	141.81	648	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	

Left closet R+D 220
1 = doorknob inside + out + [illegible]
2 = rt wall + Light switch
3 = med wall + ceiling
4 = Left wall + floor
~~[illegible]~~
5. Right closet R+D 219
5 - right ~~[illegible]~~ knob ~~inside~~ + out
6. lt wall
7. med wall + ceiling all [illegible]
8 ceiling left closet + floor
9 ceiling right Closet + floor
10 floor left closet
12 Container

Radiation Physics Consulting

7022 Warwick Road
Indianapolis, IN 46220-1051
(317) 251-0193
Pager (317) 310-4327
Cell (317) 902-9868
tschu@hotmail.com

September 29, 2002

Roche Diagnostics
9115 Hague Road
PO Box 50457
Indianapolis, IN 56250-0457

Attn: Jeanne Steinfeld, Safety Consultant

Dear Jeanne:

Thanks for the opportunity to perform survey, decontamination, waste removal and cleaning of your Research Lab Room 208 and the basement waste room, in your medical research building. Attached is a report outlining our findings and results.

If you have any questions, feel free to call or e-mail us.

Sincerely,

Thomas A. Schumacher, CHP

Thomas A. Schumacher
Certified Health Physicist
American Board of Health Physics

Radiation Physics Consulting

7022 Warwick Road
Indianapolis, IN 46220-1051
(317) 251-0193
Pager (317) 212-2042
Cell (317) 902-9868
tschu@hotmail.com

Laboratory and Waste Room Survey and Decontamination Report

Report Date: September 28, 2002
Facility: Room 208, Research Building, 9115 Hague Road, Indianapolis, IN

Report Prepared for:

Roche Diagnostics
Safety Office
9115 Hague Road
PO Box 50457
Indianapolis, IN 46250-0457

Room Descriptions:

Room 208 is a general research laboratory in the second floor of the main research building at Roche Diagnostics' Hague Road campus in Indianapolis, Indiana. It has a tile floor, composite bench tops, metal casework, and two fume hoods with outside exhaust. Based on records of prior use, activities in the lab included protein iodinations using Iodine-125, various procedures using Phosphorus-32 and Sulfur-35, as well as occasional use of Hydrogen-3 (tritium). According to an interview we conducted with the last investigator with assigned use of the room, the last radioactive procedures were performed in April of 2000. According to written logs provided by the safety office, there is evidence of tritium use as late as 1991.

The Research Building' s waste room is a small (approximately 6 X 7 foot) room with a secure door located in the basement dock area. Although not in current use, it previously held research radioactive waste for both decay-in-storage, as well as commercial disposal. The Research Building also contains a counting room, containing a beta scintillation counter, a gamma well counter, as well as a freezer and workbench.

Task Summary:

We made visits to the facilities on 8/29/02 and 9/16/02. Survey, remediation, and cleaning activities

included:

- Complete external surface radiation surveys of all bench tops, hoods, floor, equipment, shielding containers and stands, waste cans, sinks, refrigerators and experimental aids. This was accomplished using a survey meter sensitive to significant concentrations of low to high-energy beta and gamma-emitting radionuclides.

- Representative " wipe" surveys for removable contamination on surfaces and apparatus, containers, floor, sinks, handles, and waste receptacles in the laboratory and counting room.

- Decontamination and resurveying of all areas and items founds with remaining radioactive contamination.

- Complete sorting and cleaning of all the labs' items, surfaces and apparatus.

- Determination of radioactive content (counting) of abandoned, filled scintillation vials, to determine proper disposal requirements.

- Characterization of waste scintillation fluids for determination of suitability for drain disposal, or need for hazardous waste disposal.

- Removal of waste lead containers, lead sheeting and container wrapping.

Standards Guidance:

- All areas were surveyed and decontaminated for release using as guidance the provisions in the Nuclear Regulatory Commission' s Title 10 Code of Federal Regulations, Part 20, Standards for Protection Against Radiation.

- All guidance regarding release of materials or surfaces for unrestricted use follow the derived concentration guidance levels (DCGL values) as published in the Multi-Agency Radiation Surveys and Site Investigation Manual (MARSSIM).

External Survey Results

1. We surveyed all surface areas in room 208 with a Berthold LB-122 surface contamination monitor. This monitor detects and quantifies the radiation from all commonly-used beta-gamma

emitting radionuclides used in research, except for hydrogen-3 (tritium).

2. All areas were less than three times the background count rate of 13 counts per second per 100 square centimeters of surface, except for one location. This was the top of a waste container labeled on the lid: " S-35" (denoting sulfur-35).

3. A survey of all accessible surfaces in the basement waste room showed all areas indistinguishable from background.

Contamination Survey Results

We analyzed room 208' s area wipe surveys in a Beckman®liquid scintillation counter, using three regions of interest, covering the energies of all common research radionuclides. Following are the results:

	Counts/minute in listed region				Counts/minute in listed region		
Location No.	H-3	C-14/ S-35	P-32	Location No.	H-3	C-14 /S-35	P-32
Background	0	13.33	6.67	22	0	13.33	13.33
1	0	13.33	6.67	23	0	30	0
2	0	10	0	24	0	50	0
3	0	10	20	25	10	30	20
4	0	30	0	26	0	20	13.33
5	6.67	6.67	6.67	27	0	10	0
6	0	0	0	28	6.67	26.67	20
7	0	13.33	13.33	29	0	33.33	20
8	0	0	0	30	0	20	10
9	6.67	0	6.67	31	0	100	10
10	6.67	6.67	6.67	32	0	20	10
11	0	13.33	26.67	33	0	40	10
12	6.67	20	0	34	0	6.67	20
13	6.67	6.67	13.33	35	10	10	10
14	10	20	10	36	0	**210**	10
15	6.67	13.33	0	37	8.57	**1902.86**	20
16	0	20	13.33	38	0	0	10

	Counts/minute in listed region				Counts/minute in listed region		
Location No.	H-3	C-14/ S-35	P-32	Location No.	H-3	C-14 /S-35	P-32
17	0	10	20	39	0	30	0
18	0	20	6.67	40	10	40	0
19	0	70	5	41	10	90	0
20	0	53.33	6.67	42	0	50	10
21	0	33.33	13.33	Location 36 & 37 Recount	6.67	33.33	0

Samples 36 and 37 displayed count rates above the action level of 200 counts per minute and required decontamination. The samples corresponded to the lid and top of a waste container that was marked " S-35." This finding was congruent with external radiation exposure measured in the same location. After cleaning and retesting, both locations displayed count rates indistinguishable from background.

We took wide-area wipe samples of the floor, walls, and door in the **basement waste room,** which housed waste containers originating from room 208 operations. The results were:

	Counts/minute in listed region				Counts/minute in listed region		
Location No.	**H-3**	**C-14/ S-35**	**P-32**	**Location No.**	**H-3**	**C-14 /S-35**	**P-32**
Background	0	13.33	6.67	4	0	13.33	13.33
1	0	6.67	6.67	5	0	410	20
2	10	10	13.33	6	0	50	0
3	0	10	20	Location 5 Recount	0	50	13.33

At location spot 5, the wipe test' s count rate was above the action level for the C-14/S-35 energy region. After decontamination of the spot, a re-wipe and recount showed adequate cleaning for unrestricted release.

We took wide-area wipe samples of the **2nd floor counting room** floor (207), as well as the handles on interiors of the beta and gamma counters, door handles, and miscellaneous areas:

	Counts/minute in listed region				Counts/minute in listed region		
Location No.	**H-3**	**C-14/ S-35**	**P-32**	**Location No.**	**H-3**	**C-14 /S-35**	**P-32**
Background	0	13.33	6.67	Gamma Counter Handles	0	26.67	20
Beta Counter Lid	0	20	13.33	Floor at Gamma Counter	0	53.33	20
Beta Counter Interior	0	13.33	6.67	Room Door Handle	0	26.67	0
Floor at Beta Counter	6.67	13.33	20	Freezer Handles	6.67	26.67	13.33
Work Countertop	0	6.67	13.33				

We also assayed a **tray of filled scintillation vials** that were labeled for hydrogen-3 counting. Counting results were as follows:

Abandoned Scintillation Vials Labeled For Hydrogen-3 Counting (Biodegradable Fluid)			
Vial No.	Counts per minute in Region A (0-18.6 keV)	Vial No.	Counts per minute in Region A (0-18.6 keV)
Background	15	16	16
1	19	17	13
2	16	18	11
3	15	19	24
4	16	20	14
5	19	21	18
6	19	22	22
7	19	23	21

Abandoned Scintillation Vials Labeled For Hydrogen-3 Counting (Biodegradable Fluid)			
Vial No.	Counts per minute in Region A (0-18.6 keV)	Vial No.	Counts per minute in Region A (0-18.6 keV)
8	22	24	16
9	16	25	20
10	27	26	17
11	13	27	16
12	18	28	20
13	18	29	16
14	45	30	14
15	29	31	20

Conclusions/Recommendations:

1) **All areas of laboratory room 208 are free of contamination. This room is available for unrestricted use.**

2) **The basement waste room and the 2nd floor counting room 207 are free of contamination. These rooms are available for unrestricted use.**

3) **The one-gallon amber glass jug of scintillation fluid contains solvents, and should be disposed of according to proper procedures.**

4) **The tray of filled scintillation vials contain no radioactivity above background levels; and, as they contain biodegradable fluid, may be disposed of in the ordinary trash or via the sanitary sewer.**

References:

a) United States Department of Defense, United States Department of Energy, United States Environmental Protection Agency, and United States Nuclear Regulatory Commission; Multi-

Agency Radiation Surveys and Site Investigation Manual (MARSSIM); 1998

b) Title 10, Code of Federal Regulations

c) 410 Indiana Administrative Code Part 5, the Indiana Rule for Radiation Control

d) The Health Physics and Radiological Health Handbook, Scinta, Inc., 1992

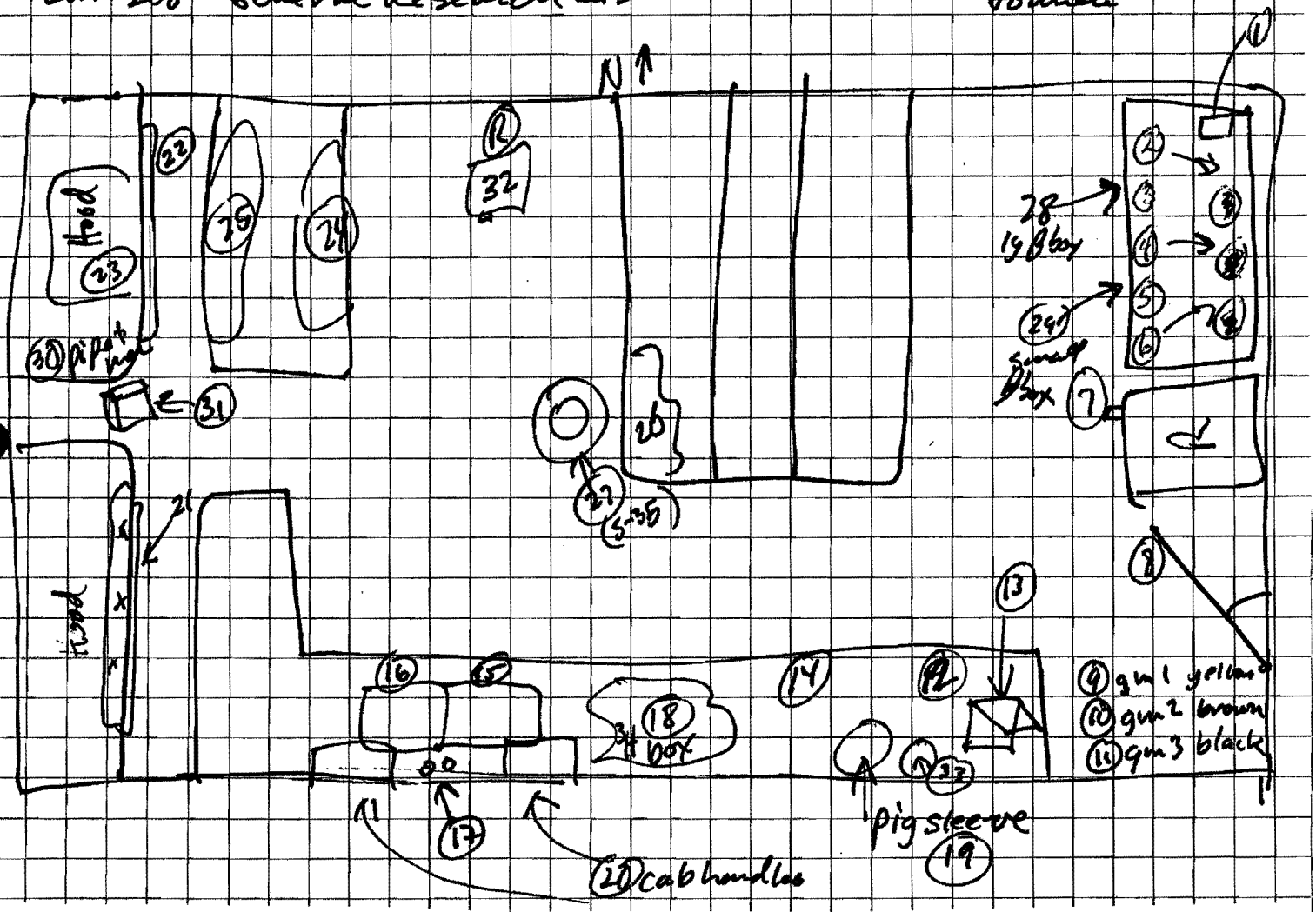
Thomas A. Schumacher

Thomas A. Schumacher, CHP
Certified Health Physicist

RADIATION PHYSICS CONSULTING
7022 WARWICK ROAD INDIANAPOLIS, IN 46220-1051
(317) 251-0193
PAGER (317) 310-4327 CELL (317) 902-9868

Roche Diagnostics
Lab 208 General Research Lab

6558-5966 cell
Mike Garrison
foreman



2 yrs in April
since last
USC

I-125 only use since Early 1990's

Some evidence of ^{3}H use as late as 1991

LSC

^{3}H std 253700 dpm on 3/9/88 14y 5mo 21d = 5283 d = 14.47 y → $\frac{14.47\ y}{12.3\ y}$ = 1.17 t½

^{14}C std 102100 " " 2/25/88 14y 6mo 3d = 14.51 y

DF = 2.3

^{3}H count Rate: 66763 cpm → ~~x 0.44 → 46 %~~ $\frac{66763}{111628}$ = 0.598 Eff

^{14}C " " 47498 cpm

^{3}H Eff = 253700 x 0.44 = 111628

^{14}C Eff = $\frac{102100}{47492}$ = 46%

Protocol #: 1 28 AUG 02 14:16
Time = 1.00
Radionuclide: H3
Region A: LL-UL= .0- 18.6 Bkg= .00 %2 Sigma= .00 Div(K)=1.00 Lcr= 0
Region B: LL-UL= 2.0- 18.6 Bkg= .00 %2 Sigma= .00 Div(K)=1.00 Lcr= 0
Region C: LL-UL= .0- .0 Bkg= .00
QIP = SIS

PID	S#	TIME	CPMA/K	CPMB/K	SIS	FLAG
	WARNING: NOT NORMALIZED					
2	1	1.00	15.00	15.00	27.927	
(	1 missing vial)					
2	3	1.00	19.00	15.00	25.769	
2	4	1.00	16.00	11.00	15.950	
2	5	1.00	15.00	10.00	18.114	
2	6	1.00	16.00	11.00	16.050	
2	7	1.00	19.00	19.00	28.130	
2	8	1.00	19.00	16.00	23.653	
2	9	1.00	19.00	16.00	21.963	
2	10	1.00	22.00	15.00	17.961	
2	11	1.00	16.00	11.00	19.688	
2	12	1.00	27.00	19.00	19.137	
35	13	1.00	13.00	5.00	15.803	
35	14	1.00	18.00	13.00	20.241	
35	15	1.00	18.00	11.00	17.477	
35	16	1.00	45.00	12.00	7.751	
35	17	1.00	29.00	13.00	13.184	
35	18	1.00	16.00	9.00	12.840	
35	19	1.00	13.00	8.00	20.495	
35	20	1.00	11.00	9.00	16.780	
35	21	1.00	24.00	17.00	15.582	
35	22	1.00	14.00	7.00	13.642	
35	23	1.00	18.00	13.00	14.891	
35	24	1.00	22.00	18.00	20.865	
4	25	1.00	21.00	17.00	23.081	
4	26	1.00	16.00	11.00	16.953	
4	27	1.00	20.00	14.00	16.451	
4	28	1.00	17.00	14.00	21.337	
4	29	1.00	16.00	14.00	16.050	
4	30	1.00	20.00	13.00	20.143	
4	31	1.00	16.00	6.00	14.044	
4	32	1.00	14.00	11.00	18.801	
4	33	1.00	20.00	16.00	22.149	

waste scint. vials from SW hood

Biodegradable Fluids

Roche Diagnostics 8/29/02 Survey
Room 208 lab

TWO PHASE : NO AQC :YES CYCLE REPEATS : 1
SCINTILLATOR: LIQUID LUMEX: NO LOW SAMPLE REJ: 50
LOW LEVEL : NO HALF LIFE CORRECTION DATE: none

ISOTOPE 1: 3H %ERROR: 2.00 FACTOR:1.0000 BKG. SUB: 0
ISOTOPE 2: 14C %ERROR: 2.00 FACTOR:1.0000 BKG. SUB: 0
ISOTOPE 3: 32P %ERROR: 2.00 FACTOR:1.0000 BKG. SUB: 0

SAM NO	POS	TIME MIN	H#	ISO	RAW CPM	CORRECTED CPM	%ERROR	DPM	EFF-1	LUM EX	ELAPSED TIME
B1	**-1	0.15	327.3	3H	0.00	0.00	0.00	67.40	0.00	43.52	1.50
				14C	13.33	13.33	141.42				
				32P	6.67	6.67	200.00				

BKG

COUNT TERMINATED: COUNT RATE TOO LOW
Blank Average DPM for 3H : 67.40 COEF. OF VAR: 0.000

```
    1 **-3    0.15 344.5      3H       0.00       0.00    0.00      54.07    0.00   11.
13     2.43
                               14C     13.33      13.33 141.42
                               32P      6.67       6.67 200.00
                 COUNT TERMINATED: COUNT RATE TOO LOW
    2 **-4    0.10 357.1      3H       0.00       0.00    0.00 *********    0.00   63.
     3.20
                               14C     10.00      10.00 200.00
                               32P      0.00       0.00    0.00
    2 **-4    INVALID SAMPLE COUNT:    QUENCH TOO HIGH FOR ACCURATE AUTO DPM
    3 **-5    0.10 360.2      3H       0.00       0.00    0.00 *********    0.00   44.
64     3.92
                               14C     10.00      10.00 200.00
                               32P     20.00      20.00 141.42
    3 **-5    INVALID SAMPLE COUNT:    QUENCH TOO HIGH FOR ACCURATE AUTO DPM
    4 **-6    0.10 355.9      3H       0.00       0.00    0.00 *********    0.00   34.
56     4.67
                               14C     30.00      30.00 115.47
                               32P      0.00       0.00    0.00
    4 **-6    INVALID SAMPLE COUNT:    QUENCH TOO HIGH FOR ACCURATE AUTO DPM
    5 **-7    0.15 376.1      3H       6.67       6.67 200.00 *********    0.00   38.
74     5.53
                               14C      6.67       6.67 200.00
                               32P      6.67       6.67 200.00
    5 **-7    INVALID SAMPLE COUNT:    QUENCH TOO HIGH FOR ACCURATE AUTO DPM
    6 **-8    0.10 383.4      3H       0.00       0.00    0.00 *********    0.00   56.
79     6.29
                               14C      0.00       0.00    0.00
                               32P      0.00       0.00    0.00
    6 **-8    INVALID SAMPLE COUNT:    QUENCH TOO HIGH FOR ACCURATE AUTO DPM
    7 **-9    0.15 380.3      3H       0.00       0.00    0.00 *********    0.00   31.
47     7.21
                               14C     13.33      13.33 141.42
                               32P     13.33      13.33 141.42
    7 **-9    INVALID SAMPLE COUNT:    QUENCH TOO HIGH FOR ACCURATE AUTO DPM
    8 **-10   0.15 331.8      3H       0.00       0.00    0.00 *********    0.00   28.
77     8.03
                               14C      0.00       0.00    0.00
                               32P      0.00       0.00    0.00
                 COUNT TERMINATED: COUNT RATE TOO LOW
                 COUNT RATE TOO LOW OR TOO COMPRESSED
    9 **-11   0.15 333.3      3H       6.67       6.67 200.00      9.28    8.69    9.
20     8.96
                               14C      0.00       0.00    0.00
                               32P      6.67       6.67 200.00
                 COUNT TERMINATED: COUNT RATE TOO LOW
```

SAM EX	POS NO	ELAPSED TIME MIN	TIME	H#	ISO	RAW CPM	CORRECTED CPM	%ERROR	DPM	EFF-1 %	LUM TIME
10	**-12	0.15	332.1		3H	6.67	6.67	200.00	15.95	8.00	6.66
	9.82										
					14C	6.67	6.67	200.00			
					32P	6.67	6.67	200.00			
		COUNT TERMINATED: COUNT RATE TOO LOW									
11	**-13	0.15	335.9		3H	0.00	0.00	0.00	*********	0.00	8.
	10.69										
					14C	13.33	13.33	141.42			
					32P	26.67	26.67	100.00			
		COUNT TERMINATED: COUNT RATE TOO LOW									
		COUNT RATE TOO LOW OR TOO COMPRESSED									
12	**-14	0.15	332.9		3H	6.67	6.67	200.00	7.79	8.87	7.
71	11.57										

```
                                14C      20.00      20.00 115.47
                                32P       0.00       0.00   0.00
                COUNT TERMINATED: COUNT RATE TOO LOW
   13 **-15   0.15 347.4        3H       6.67       6.67 200.00      15.95    8.00   16.
47    12.41
                                14C       6.67       6.67 200.00
                                32P      13.33      13.33 141.42
                COUNT TERMINATED: COUNT RATE TOO LOW
   14 **-16   0.10 357.4        3H      10.00      10.00 200.00 *********    0.00   34.
71    13.21
                                14C      20.00      20.00 141.42
                                32P      10.00      10.00 200.00
   14 **-16    INVALID SAMPLE COUNT:    QUENCH TOO HIGH FOR ACCURATE AUTO DPM
   15 **-17   0.15 343.7        3H       6.67       6.67 200.00      9.28    8.69   16.
02    14.10
                                14C      13.33      13.33 141.42
                                32P       0.00       0.00   0.00
                COUNT TERMINATED: COUNT RATE TOO LOW
   16 **-18   0.15 342.3        3H       0.00       0.00   0.00     20.00    0.00    2.
93    14.98
                                14C      20.00      20.00 115.47
                                32P      13.33      13.33 141.42
                COUNT TERMINATED: COUNT RATE TOO LOW
   17 **-1    0.10 350.6        3H       0.00       0.00   0.00 *********    0.00    7.
63    15.91
                                14C      10.00      10.00 200.00
                                32P      20.00      20.00 141.42
   17 **-1     INVALID SAMPLE COUNT:    QUENCH TOO HIGH FOR ACCURATE AUTO DPM
   18 **-2    0.15 345.5        3H       0.00       0.00   0.00     54.07    0.00   14.
18    16.79
                                14C      20.00      20.00 115.47
                                32P       6.67       6.67 200.00
                COUNT TERMINATED: COUNT RATE TOO LOW
   19 **-3    0.20 441.1        3H       0.00       0.00   0.00 *********    0.00   56.
45    17.89
                                14C      70.00      70.00  53.45
                                32P       5.00       5.00 200.00
   19 **-3     INVALID SAMPLE COUNT:    QUENCH TOO HIGH FOR ACCURATE AUTO DPM
   20 **-4    0.15 450.7        3H       0.00       0.00   0.00 *********    0.00   58.
03    18.81
                                14C      53.33      53.33  70.71
                                32P       6.67       6.67 200.00
   20 **-4     INVALID SAMPLE COUNT:    QUENCH TOO HIGH FOR ACCURATE AUTO DPM
   21 **-5    0.15 460.6        3H       0.00       0.00   0.00 *********    0.00   75.
38    19.71
                                14C      33.33      33.33  89.44
                                32P      13.33      13.33 141.42
   21 **-5     INVALID SAMPLE COUNT:    QUENCH TOO HIGH FOR ACCURATE AUTO DPM
   22 **-6    0.15 355.0        3H       0.00       0.00   0.00 *********    0.00   32.
43    20.58
                                14C      13.33      13.33 141.42
                                32P      13.33      13.33 141.42
   22 **-6     INVALID SAMPLE COUNT:    QUENCH TOO HIGH FOR ACCURATE AUTO DPM
   23 **-7    0.10 387.1        3H       0.00       0.00   0.00 *********    0.00   46.
32    21.31
                                14C      30.00      30.00 115.47
                                32P       0.00       0.00   0.00
   23 **-7     INVALID SAMPLE COUNT:    QUENCH TOO HIGH FOR ACCURATE AUTO DPM
```

SAM EX %	POS NO	TIME ELAPSED TIME	H# MIN	ISO	RAW CPM	CORRECTED CPM	%ERROR	DPM	EFF-1	LUM
	24	**-8	0.10 370.4	3H	0.00	0.00	0.00 *********		0.00	54.
61		22.06								
				14C	50.00	50.00	89.44			
				32P	0.00	0.00	0.00			
	24	**-8	INVALID SAMPLE	COUNT:		QUENCH TOO HIGH FOR ACCURATE AUTO DPM				
	25	**-9	0.10 366.7	3H	10.00	10.00	200.00 *********		0.00	33.
87		22.81								
				14C	30.00	30.00	115.47			
				32P	20.00	20.00	141.42			
	25	**-9	INVALID SAMPLE	COUNT:		QUENCH TOO HIGH FOR ACCURATE AUTO DPM				
	26	**-10	0.15 399.7	3H	0.00	0.00	0.00 *********		0.00	57.
12		23.69								
				14C	30.00	30.00	115.47			

```
                                32P      13.33      13.33 141.42
   26 **-10   INVALID SAMPLE COUNT:     QUENCH TOO HIGH FOR ACCURATE AUTO DPM
   27 **-11    0.10 398.0      3H       0.00       0.00   0.00 *********   0.00 100.
00    24.43
                                14C      10.00      10.00 200.00
                                32P       0.00       0.00   0.00
   27 **-11   INVALID SAMPLE COUNT:     QUENCH TOO HIGH FOR ACCURATE AUTO DPM
   28 **-12    0.15 410.1      3H       6.67       6.67 200.00 *********   0.00  54.
79    25.34
                                14C      26.67      26.67 100.00
                                32P      20.00      20.00 115.47
   28 **-12   INVALID SAMPLE COUNT:     QUENCH TOO HIGH FOR ACCURATE AUTO DPM
   29 **-13    0.15 436.1      3H       0.00       0.00   0.00 *********   0.00  29.
60    26.24
                                14C      33.33      33.33  89.44
                                32P      20.00      20.00 115.47
   29 **-13   INVALID SAMPLE COUNT:     QUENCH TOO HIGH FOR ACCURATE AUTO DPM
   30 **-14    0.10 380.9      3H       0.00       0.00   0.00 *********   0.00  90.
09    26.97
                                14C      20.00      20.00 141.42
                                32P      10.00      10.00 200.00
   30 **-14   INVALID SAMPLE COUNT:     QUENCH TOO HIGH FOR ACCURATE AUTO DPM
   31 **-15    0.10 410.9      3H       0.00       0.00   0.00 *********   0.00  52.
77    27.70
                                14C     100.00     100.00  63.25
                                32P      10.00      10.00 200.00
   31 **-15   INVALID SAMPLE COUNT:     QUENCH TOO HIGH FOR ACCURATE AUTO DPM
   32 **-16    0.10 360.2      3H       0.00       0.00   0.00 *********   0.00  55.
88    28.47
                                14C      20.00      20.00 141.42
                                32P      10.00      10.00 200.00
   32 **-16   INVALID SAMPLE COUNT:     QUENCH TOO HIGH FOR ACCURATE AUTO DPM
   33 **-17    0.10 409.5      3H       0.00       0.00   0.00 *********   0.00  22.
85    29.20
                                14C      40.00      40.00 100.00
                                32P      10.00      10.00 200.00
   33 **-17   INVALID SAMPLE COUNT:     QUENCH TOO HIGH FOR ACCURATE AUTO DPM
   34 **-18    0.15 418.5      3H       0.00       0.00   0.00 *********   0.00  37.
23    30.07
                                14C       6.67       6.67 200.00
                                32P      20.00      20.00 115.47
   34 **-18   INVALID SAMPLE COUNT:     QUENCH TOO HIGH FOR ACCURATE AUTO DPM
   35 **-1     0.10 364.2      3H      10.00      10.00 200.00 *********   0.00  36.
66    30.91
                                14C      10.00      10.00 200.00
                                32P      10.00      10.00 200.00
   35 **-1    INVALID SAMPLE COUNT:     QUENCH TOO HIGH FOR ACCURATE AUTO DPM
   36 **-2     0.10 429.1      3H       0.00       0.00   0.00 *********   0.00  95.
69    31.68
                                14C     210.00     210.00  43.64
                                32P      10.00      10.00 200.00
   36 **-2    INVALID SAMPLE COUNT:     QUENCH TOO HIGH FOR ACCURATE AUTO DPM
   37 **-3     0.35 489.2      3H       8.57       8.57 115.47 *********   0.00 100.
00    33.43
                                14C    1902.86    1902.86   7.75
                                32P      20.00      20.00  75.59
   37 **-3    INVALID SAMPLE COUNT:     QUENCH TOO HIGH FOR ACCURATE AUTO DPM
```

SAM NO	POS	TIME MIN	H#	ISO	RAW CPM	CORRECTED CPM	%ERROR	DPM	EFF-1	LUM EX %	ELAPSED TIME
38	**-4	0.10	360.0	3H	0.00	0.00	0.00	*********	0.00	95.	34.17
				14C	0.00	0.00	0.00				
				32P	10.00	10.00	200.00				
38	**-4	INVALID SAMPLE		COUNT:	QUENCH TOO HIGH FOR ACCURATE AUTO DPM						
39	**-5	0.10	393.0	3H	0.00	0.00	0.00	*********	0.00	99.	34.93
				14C	30.00	30.00	115.47				
				32P	0.00	0.00	0.00				
39	**-5	INVALID SAMPLE		COUNT:	QUENCH TOO HIGH FOR ACCURATE AUTO DPM						
40	**-6	0.10	366.5	3H	10.00	10.00	200.00	*********	0.00	44.	35.65
				14C	40.00	40.00	100.00				

```
                                    32P       0.00       0.00    0.00
    40 **-6     INVALID SAMPLE COUNT:     QUENCH TOO HIGH FOR ACCURATE AUTO DPM
    41 **-7      0.10 392.2      3H      10.00      10.00 200.00 *********    0.00  70.
57      36.38
                                    14C     90.00      90.00  66.67
                                    32P      0.00       0.00   0.00
    41 **-7     INVALID SAMPLE COUNT:     QUENCH TOO HIGH FOR ACCURATE AUTO DPM
    42 **-8      0.10 403.2      3H       0.00       0.00   0.00 *********    0.00  39.
71      37.12
                                    14C     50.00      50.00  89.44
                                    32P     10.00      10.00 200.00
    42 **-8     INVALID SAMPLE COUNT:     QUENCH TOO HIGH FOR ACCURATE AUTO DPM
    43 **-9      0.15 431.5      3H       0.00       0.00   0.00 *********    0.00 100.
00      38.01
                                    14C     20.00      20.00 115.47
                                    32P      6.67       6.67 200.00
    43 **-9     INVALID SAMPLE COUNT:     QUENCH TOO HIGH FOR ACCURATE AUTO DPM
    44 **-10     0.15 445.3      3H       0.00       0.00   0.00 *********    0.00  96.
88      38.93
                                    14C     33.33      33.33  89.44
                                    32P     20.00      20.00 115.47
    44 **-10    INVALID SAMPLE COUNT:     QUENCH TOO HIGH FOR ACCURATE AUTO DPM
```

Protocol #: 1 28 AUG 02 12:59
Time = 1.00
Radionuclide: H3
Region A: LL-UL= .0- 18.6 Bkg= .00 %2 Sigma= .00 Div(K)=1.00 Lcr= 0
Region B: LL-UL= 2.0- 18.6 Bkg= .00 %2 Sigma= .00 Div(K)=1.00 Lcr= 0
Region C: LL-UL= .0- .0 Bkg= .00
QIP = SIS

PID	S#	TIME	CPMA/K	CPMB/K	SIS	FLAG
WARNING: NOT NORMALIZED						
2	1	1.00	16.00	11.00	16.509	
2	2	1.00	66779.0	40428.0	9.555	
2	3	1.00	47492.0	44434.0	31.047	

Cff checks
Roche LSC

Protocol #: 1 28 AUG 02 13:06
Time = 1.00
Radionuclide: H3
Region A: LL-UL= .0- 18.6 Bkg= .00 %2 Sigma= .00 Div(K)=1.00 Lcr= 0
Region B: LL-UL= 2.0- 18.6 Bkg= .00 %2 Sigma= .00 Div(K)=1.00 Lcr= 0
Region C: LL-UL= .0- .0 Bkg= .00
QIP = SIS

PID	S#	TIME	CPMA/K	CPMB/K	SIS	FLAG
WARNING: NOT NORMALIZED						
2	1	1.00	13.00	7.00	11.482	
2	2	1.00	66448.0	40241.0	9.539	
2	3	1.00	47447.0	44402.0	31.103	

Protocol #: 1 28 AUG 02 13:13
Time = 1.00
Radionuclide: H3
Region A: LL-UL= .0- 18.6 Bkg= .00 %2 Sigma= .00 Div(K)=1.00 Lcr= 0
Region B: LL-UL= 2.0- 18.6 Bkg= .00 %2 Sigma= .00 Div(K)=1.00 Lcr= 0
Region C: LL-UL= .0- .0 Bkg= .00
QIP = SIS

PID	S#	TIME	CPMA/K	CPMB/K	SIS	FLAG
	WARNING: NOT NORMALIZED					
2	1	1.00	15.00	12.00	16.585	
2	2	1.00	66951.0	40530.0	9.548	
2	3	1.00	47467.0	44441.0	31.026	

Protocol #: 1 28 AUG 02 13:20
Time = 1.00
Radionuclide: H3
Region A: LL-UL= .0- 18.6 Bkg= .00 %2 Sigma= .00 Div(K)=1.00 Lcr= 0
Region B: LL-UL= 2.0- 18.6 Bkg= .00 %2 Sigma= .00 Div(K)=1.00 Lcr= 0
Region C: LL-UL= .0- .0 Bkg= .00
QIP = SIS

PID	S#	TIME	CPMA/K	CPMB/K	SIS	FLAG
WARNING: NOT NORMALIZED						
2	1	1.00	22.00	8.00	9.046	
2	2	1.00	66377.0	40410.0	9.582	
2	3	1.00	47640.0	44586.0	30.958	

Radiation Physics Consulting

7022 Warwick Road
Indianapolis, IN 46220-1051
(317) 251-0193
Pager (317) 212-2042
Cell (317) 902-9868
tschu@hotmail.com

Waste Room Survey Report

Report Date: February 15, 2011
Facility: Dock Area Radioactive Waste Room; Research Building, 9115 Hague Road, Indianapolis, IN

Report Prepared for:

Roche Diagnostics
Safety, Environment and Health (SHE) Office
9115 Hague Road
Indianapolis, IN 46250-0457

Room Description:

The Radioactive Waste Room is a small (approximately 6 X 7 foot) unnumbered room with a secure door located in the basement dock area of the main research building at Roche Diagnostics' Hague Road campus in Indianapolis, Indiana. It currently is empty of any radioactive materials. It previously held research radioactive waste for both decay-in-storage, as well as commercial disposal. Based on records of prior use, the waste materials stored in the room from radionuclide activities in the building included Iodine-125, Phosphorus-32, Sulfur-35, as well as occasional use of Hydrogen-3 (tritium). There has been only occasional storage in the room over the past several years. It has a concrete floor, sheetrock walls, and solid core wood door. There is ductwork in the ceiling, but no outside exhaust.

Task Summary:

A survey of the room on 2/14/11 consisted of a complete external surface radiation surveys of a sample of all accessible floor and wall surfaces, door handles, shielding containers and stands, and waste cans This was accomplished using a survey meter sensitive to significant concentrations of low to high-energy beta and gamma-emitting radionuclides.

Representative wide area "wipe" surveys for removable low-energy beta-emitter contamination (e.g. H-3) on surfaces were also performed.

Standards Guidance:

- All areas were surveyed for release using as guidance the provisions of the following:
  - Nuclear Regulatory Commission's Title 10 Code of Federal Regulations, Part 20, Standards for Protection Against Radiation, and

- Consolidated Guidance About Materials Licenses: Program-Specific Guidance About Academic, Research and Development, and Other Licenses of Limited Scope Including Gas Chromatographs and X-Ray Fluorescence Analyzers (NUREG-1556, Volume 7)

External Survey Results

1. We surveyed all surface areas in the Waste Room with a Contamat® Model FHT111M, surface contamination monitor. This monitor detects and quantifies the radiation from all commonly-used beta-gamma emitting radionuclides used in research, except for hydrogen-3 (tritium).

2. All areas were less than twice the background count rate of 18 counts per second per 150 square centimeters of surface, denoting negligible activity present

Contamination Survey Results

We analyzed the room's area wipe surveys in a Beckman® LS-6500 liquid scintillation counter, using three regions of interest, covering the energies of all common research radionuclides. Following are the results:

	Net Counts/Minute in Listed Region		
Location No.	H-3	C-14/ S-35	P-32
Background	74	27	25
Inside Door Handle	35	27	-7
Outside Door Handle	29	22	-1
Inside Gray Bin	42	32	-7
North Wall	11	26	0
Outside Gray Bin	82	75	3
Floor (west)	1523	1547	-12
Floor (east)	1093	908	-3
Fiberboard Drums	48	39	-6
Lucite® beta shields	252	204	-8

Samples 6 and 7 displayed count rates of 1523 and 1093, respectively. However, this is below the dpm screening value for building surface contamination as listed in NUREG-1556, Volume 7.

Conclusions/Recommendations:

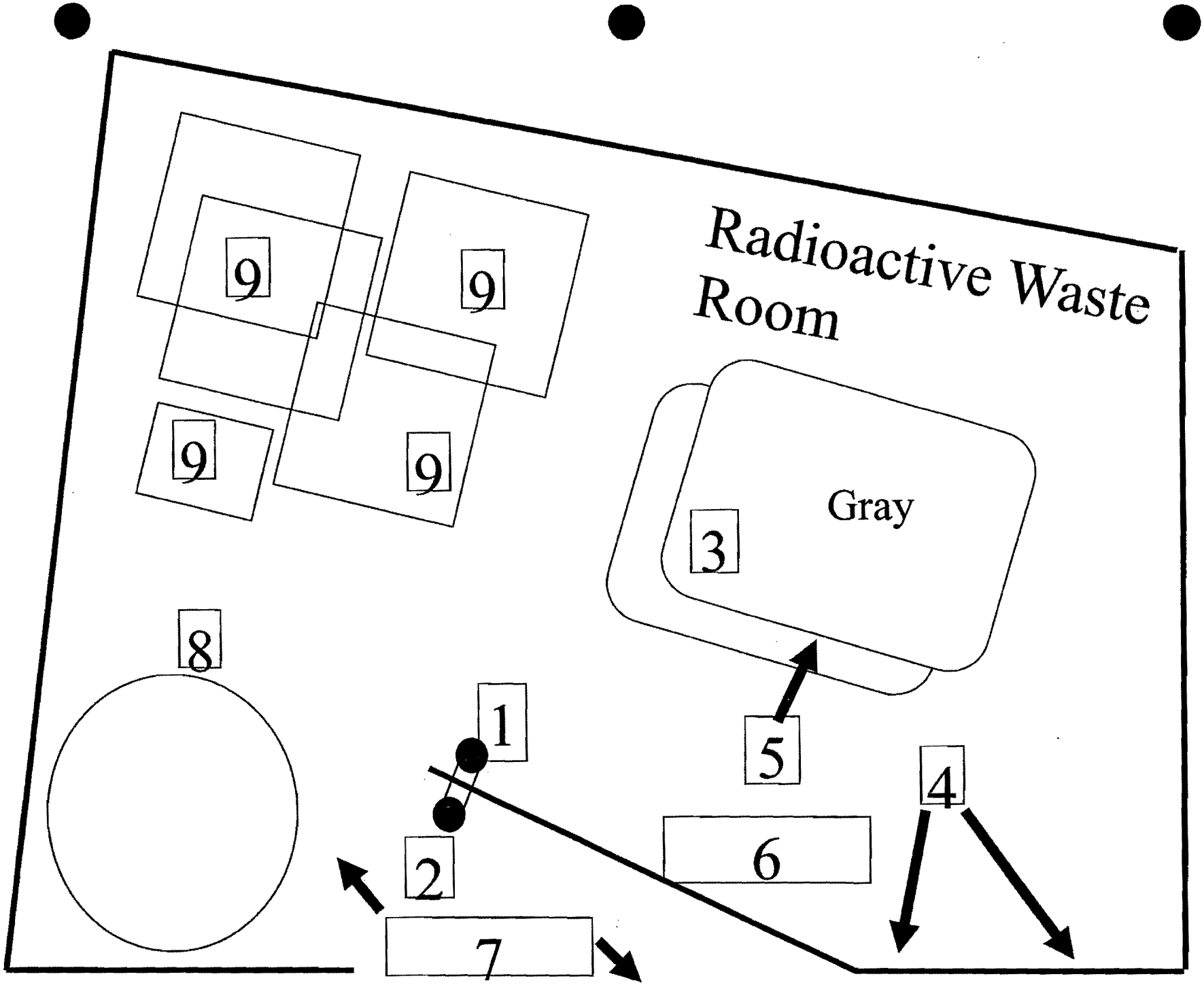
The Waste Room is free of contamination. This room is available for unrestricted access.

Thomas A. Schumacher

Thomas A. Schumacher, MS, CHP
Certified Health Physicist

Attachments:
- Room Survey Diagram
- Wipe Test Results

RADIATION PHYSICS CONSULTING
7022 WARWICK ROAD INDIANAPOLIS, IN 46220-1051
(317) 251-0193
PAGER (317) 310-4327 CELL (317) 902-9868


Radioactive Waste Room
9
9
9
9
Gray
3
8
1
2
5
4
6
7

Roche Diagnostics

Radioactive Waste Room

ID = SWIPE TEST 15 FEB 2011 14:55
USER: 2 COMMENT:PLEASE DO NOT CHANGE PRM

PRESET TIME :	1.00						
DATA CALC :	CPM	HH :	YES	SAMPLE REPEATS:	1	PRINTER	: STD
COUNT BLANK :	YES	ICH :	NO	REPLICATES :	1	RS232	: OFF
TWO PHASE :	NO	AQC :	YES	CYCLE REPEATS :	1		
SCINTILLATOR:	LIQUID	LUMEX:	NO	LOW SAMPLE REJ:	50		
LOW LEVEL :	NO	HALF LIFE CORRECTION DATE:			none		

ISOTOPE 1:	3H	%ERROR: 2.00	FACTOR:1.0000	BKG. SUB:	0
ISOTOPE 2:	14C	%ERROR: 2.00	FACTOR:1.0000	BKG. SUB:	0
ISOTOPE 3:	32P	%ERROR: 2.00	FACTOR:1.0000	BKG. SUB:	0

SAM NO	POS	TIME MIN	HH	3H CPM	3H %ERROR	14C CPM	14C %ERROR	32P CPM	32P %ERROR	LUMEX %	ELAPSED TIME
B1	**-1	1.00	285.7	74.00	23.25	27.00	38.47	25.00	40.00	65.42	1.52

Background

Blank Average CPM for 3H 74.00 COEF. OF VAR: 0.000
Blank Average CPM for 14C 27.00 COEF. OF VAR: 0.000
Blank Average CPM for 32P 25.00 COEF. OF VAR: 0.000

1	**-3	1.00	301.4	35.00	77.30	27.00	64.67	-7.00	1.E+06	79.71	3.14
2	**-4	1.00	306.2	29.00	91.75	22.00	79.25	-1.00	1.E+06	75.11	4.85
3	**-5	1.00	312.3	42.00	65.64	32.00	57.96	-7.00	1.E+06	86.37	6.46
4	**-6	1.00	314.6	11.00	209.26	26.00	68.80	0.00	1.E+06	74.08	8.08
5	**-7	1.00	319.7	82.00	36.99	75.00	30.29	3.00	485.34	85.57	9.70
6	**-8	1.00	333.3	1523.00	5.37	1547.00	5.17	-12.00	1.E+06	98.68	11.59
7	**-9	1.00	327.9	1093.00	6.45	908.00	6.83	-3.00	1.E+06	97.82	13.39
8	**-10	1.00	317.3	48.00	58.33	39.00	49.45	-6.00	1.E+06	72.50	15.05
9	**-11	1.00	321.7	252.00	15.87	204.00	15.75	-8.00	1.E+06	93.65	16.72

Radiation Physics Consulting

7022 Warwick Road
Indianapolis, IN 46220-1051
(317) 251-0193
Pager (317) 310-4327
Cell (317) 902-9868
radphysics@msn.com

Building Decommissioning Survey and Report

Report Date: October 7, 2011
Facility: Building D, 9115 Hague Road, Indianapolis, IN

Report Prepared for:

Roche Diagnostics Corporation
Safety, Health and Environmental Office
9115 Hague Road PO Box 50457
Indianapolis, IN 46250-0457

Building and Room Descriptions:

Building D was the historic center of research operations at the Roche Diagnostics Hague Road campus in Indianapolis, Indiana. There were several rooms identified in a historic site assessment survey as having active byproduct materials during the course of licensed activities. Reliable architectural drawings with former room layouts were compared with current drawings, and the current locations were identified. One was on the ground floor, and the remaining ones were on the second floor. Although there has been extensive remodeling of the involved laboratory areas, many of the original research bench tops, sinks and hoods remain in their original locations. The tile floors of the laboratories have been replaced during renovations. The rooms have been in some cases combined, and all have been renumbered. The following rooms were identified in historic license documents, and cross-referenced with their corresponding new lab numbers:

Old Lab Number	New Lab Number
203	211
204/205	210
205	210
224	216
121	108

Based on use records, principal procedures in the labs were carried out with such short-lived radionuclides as P-32 and I-125, but activities in the laboratories may have included the long-lived nuclides of Carbon-14 and Hydrogen-3 (tritium).

No current freezers or refrigerators were identified as being in use during the period of radionuclide use.

Task Summary:

Surveys were undertaken on 9/28/11 to find any residual contamination in each room from Carbon-14 and Hydrogen-3 (tritium). Surveys consisted of:

- Complete, direct external surface radiation surveys of all surfaces of bench tops, hoods, and sinks. This was accomplished using a Thermo Eberline® Model Contamat FHT111M (s/n 03983, calibration date 8/17/2011) proportional counter. This dedicated wide-area (200 square centimeter) surface survey meter is sensitive to significant concentrations of low to high-energy beta and gamma-emitting radionuclides.

- Representative wide-area "wipe" surveys for removable contamination on surfaces, floors, and sink interiors. These were counted by liquid scintillation analysis at counting efficiencies for H-3 and C-14 of 57% and 95%, respectively.

- Samples of sink traps using absorbent material, also counted by liquid scintillation analysis.

Standards Guidance:

- All areas were surveyed and decontaminated for release using as guidance the provisions in the Nuclear Regulatory Commission's Title 10 Code of Federal Regulations, Part 20, Standards for Protection Against Radiation.

- All guidance regarding release of materials or surfaces for unrestricted use follow the derived concentration guidance levels (DCGL values) as published in the Multi-Agency Radiation Surveys and Site Investigation Manual (MARSSIM).

External Survey Results

1. We surveyed all surface areas in the indicated rooms with the surface contamination monitor, using a sampling rate of one meter face-width per 2 seconds. This monitor detects and quantifies the radiation from all commonly-used beta-gamma emitting radionuclides used in research, except for hydrogen-3 (tritium).

2. **All areas were less than twice the background count rate of 15 counts per second per 100 square centimeters of surface.**

Removable Contamination Survey Results

We analyzed the wipe samples from the rooms' wide area (500 square centimeter) removable contamination

surveys in a Beckman® LS-6500 liquid scintillation counter. Three regions of interest we used, covering the energies of all common research radionuclides, including H-3 and C-14. Attached are the diagrams of the test locations and the results. All surfaces and areas surveyed produced less than 250 disintegrations per minute per sample.

Conclusions/Recommendations:

1) The laboratory rooms, hoods and sinks are free of contamination and releasable for unrestricted use.

References:

a) United States Department of Defense, United States Department of Energy, United States Environmental Protection Agency, and United States Nuclear Regulatory Commission; Multi-Agency Radiation Surveys and Site Investigation Manual (MARSSIM); 1998

b) Title 10, Code of Federal Regulations

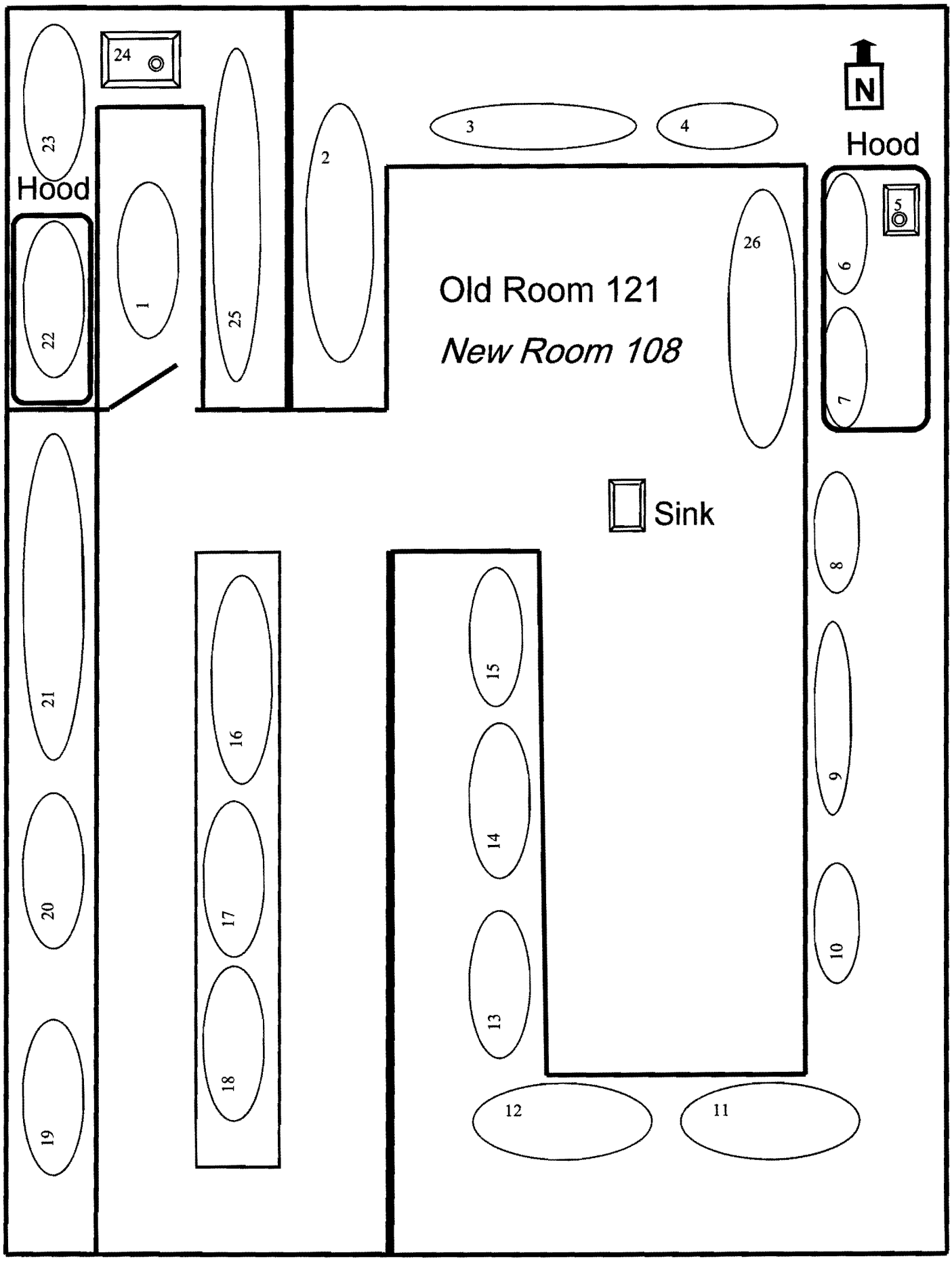
c) 410 Indiana Administrative Code Part 5, the Indiana Rule for Radiation Control

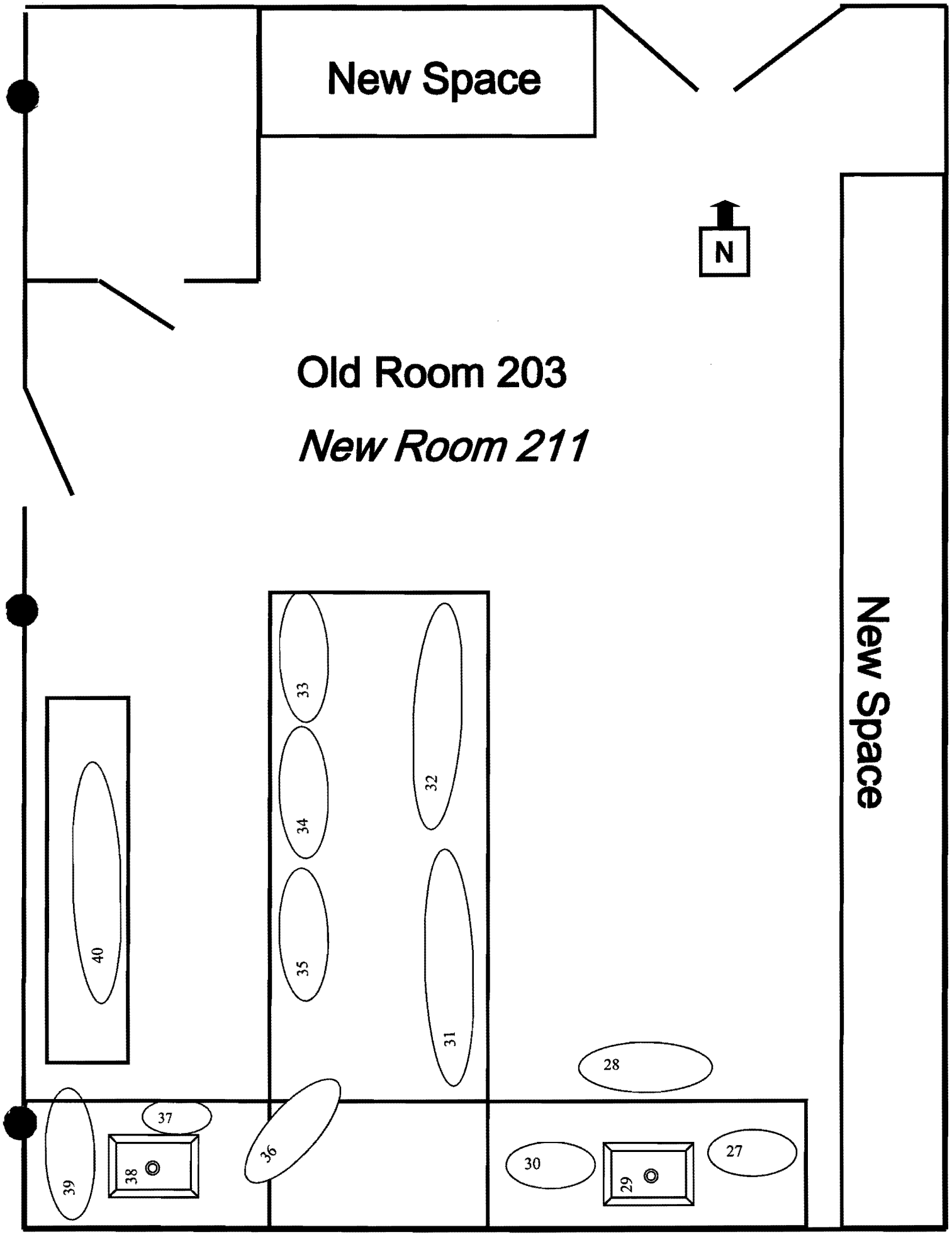
d) The Health Physics and Radiological Health Handbook, Scinta, Inc., 1992

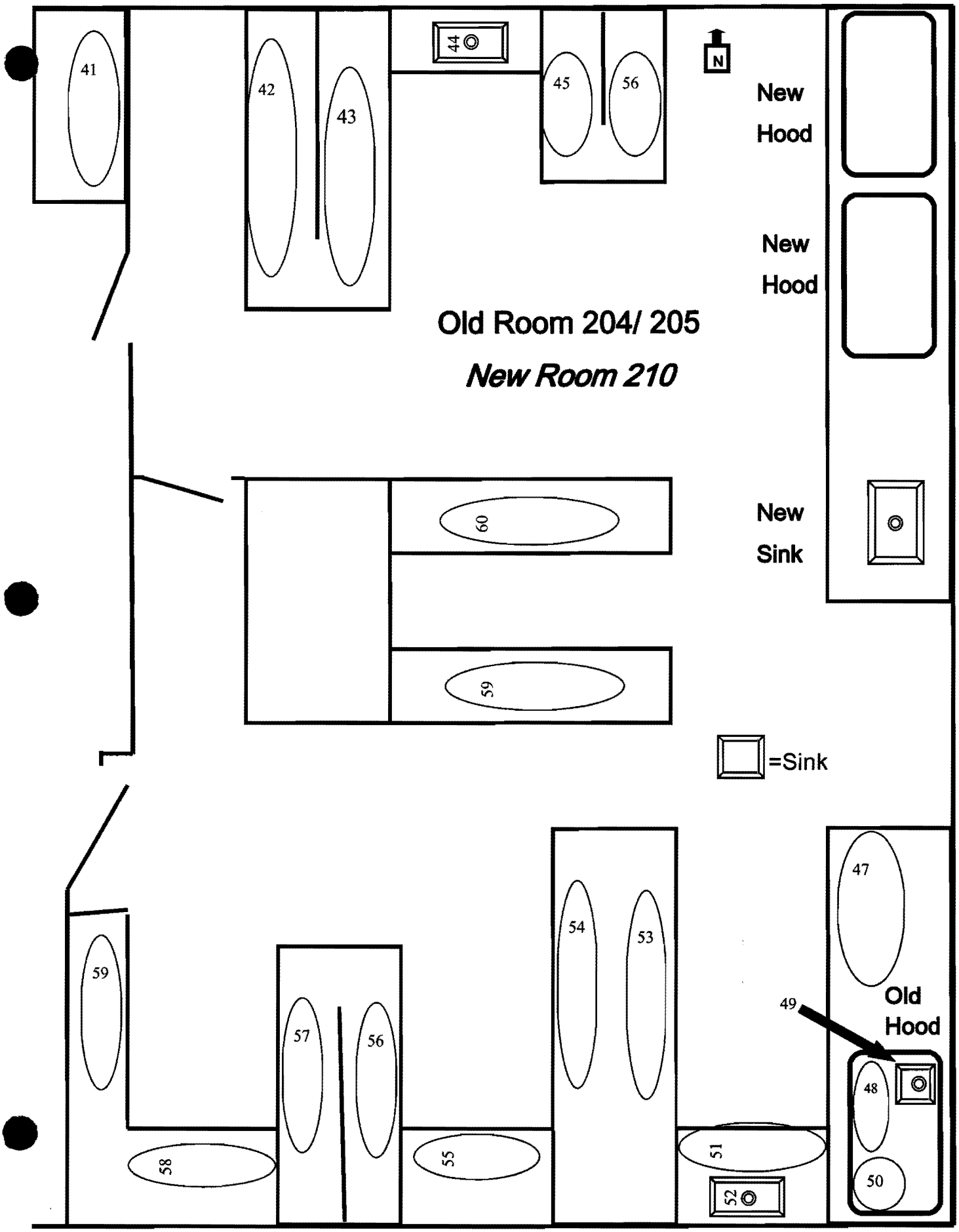
Thomas A. Schumacher

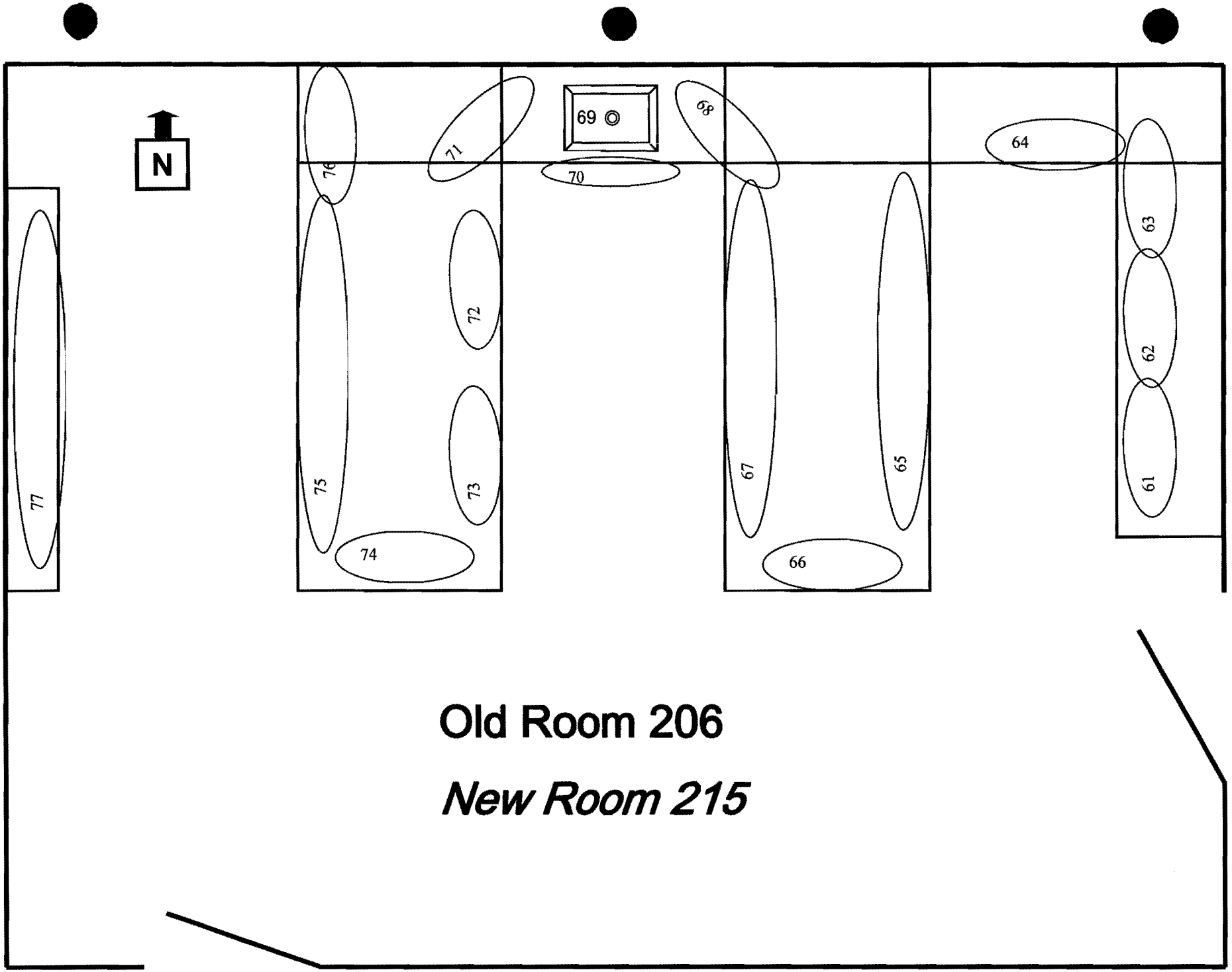
Thomas A. Schumacher, MS, CHP
Certified Health Physicist

RADIATION PHYSICS CONSULTING
7022 WARWICK ROAD INDIANAPOLIS, IN 46220-1051
(317) 251-0193
PAGER (317) 310-4327 CELL (317) 902-9868


N
Hood
Hood
Old Room 121
New Room 108
Sink
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26

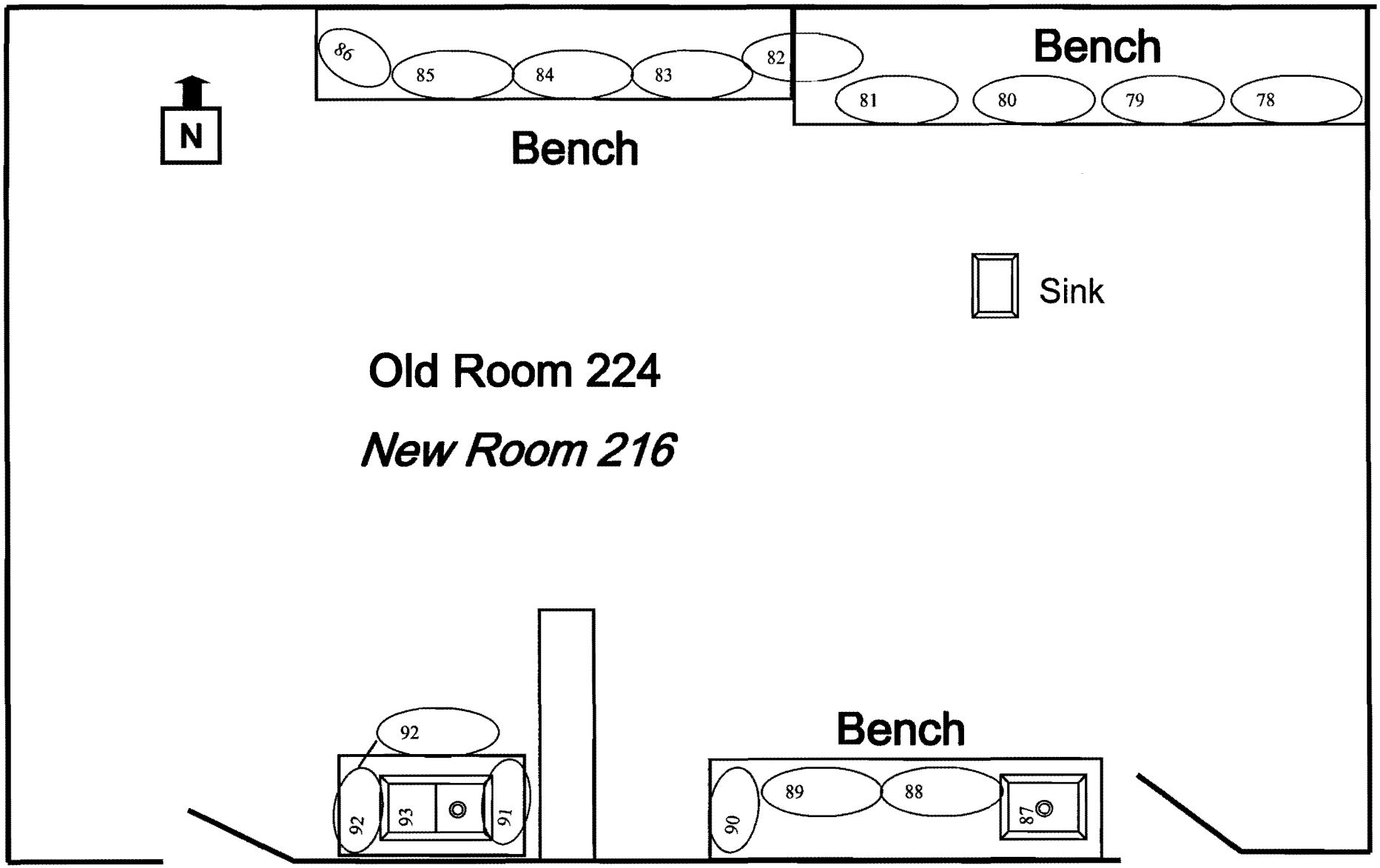

New Space
N
Old Room 203
New Room 211
New Space
33
32
34
40
35
31
28
37
36
39
38
30
29
27


41
42
43
44
45
56
N
New
Hood
New
Hood
Old Room 204/ 205
New Room 210
60
New
Sink
59
=Sink
59
57
56
54
53
47
49
Old
Hood
48
58
55
51
52
50



Old Room 206

New Room 215


N
86
85
84
83
82
Bench
81
80
79
78
Bench
Sink
Old Room 224
New Room 216
92
92
93
91
Bench
89
88
90
87

ID = SWIPE TEST 29 SEP 2011 15:18
USER: 2 COMMENT:PLEASE DO NOT CHANGE PGRM
PRESET TIME : 1.00
DATA CALC : CPM H# :YES SAMPLE REPEATS: 1 PRINTER : STD
COUNT BLANK : YES IC# : NO REPLICATES : 1 RS232 : OFF
TWO PHASE : NO AQC :YES CYCLE REPEATS : 1
SCINTILLATOR: LIQUID LUMEX: NO LOW SAMPLE REJ: 50
LOW LEVEL : NO HALF LIFE CORRECTION DATE: none

Efficiencies:
H-3 : 57.1%
C-14 : 94.6%

ISOTOPE 1: 3H %ERROR: 2.00 FACTOR:1.0000 BKG. SUB: 0
ISOTOPE 2: 14C %ERROR: 2.00 FACTOR:1.0000 BKG. SUB: 0
ISOTOPE 3: 32P %ERROR: 2.00 FACTOR:1.0000 BKG. SUB: 0

SAM NO	POS	TIME MIN	H#	3H CPM	3H %ERROR	14C CPM	14C %ERROR	32P CPM	32P %ERROR	LUMEX %	ELAPSED TIME
B1	**-1	0.15	320.8	0.00	0.00	20.00	115.47	0.00	0.00	68.69	0.69
		COUNT TERMINATED: COUNT RATE TOO LOW									
Background		Blank Average CPM for 3H		0.00	COEF. OF VAR:	0.000					
		Blank Average CPM for 14C		20.00	COEF. OF VAR:	0.000					
		Blank Average CPM for 32P		0.00	COEF. OF VAR:	0.000					
1	**-3	1.00	337.8	41.00	31.23	30.00	90.27	13.00	55.47	71.58	2.38
2	**-4	1.00	340.5	40.00	31.62	43.00	65.17	7.00	75.59	76.54	4.14
MISSING SAMPLE											
4	**-6	0.50	327.8	12.00	81.65	2.00	1331.7	6.00	115.47	61.97	5.39
		COUNT TERMINATED: COUNT RATE TOO LOW									
5	**-7	0.15	322.8	13.33	141.42	0.00	1.E+06	0.00	0.00	79.43	6.26
		COUNT TERMINATED: COUNT RATE TOO LOW									
6	**-8	0.55	322.2	16.36	66.67	-5.45	1.E+06	12.73	75.59	41.25	7.52
		COUNT TERMINATED: COUNT RATE TOO LOW									
7	**-9	0.15	323.3	20.00	115.47	-13.33	1.E+06	0.00	0.00	100.00	8.40
		COUNT TERMINATED: COUNT RATE TOO LOW									
8	**-10	0.25	324.4	16.00	100.00	8.00	391.58	4.00	200.00	59.17	9.28
		COUNT TERMINATED: COUNT RATE TOO LOW									
9	**-11	1.00	327.2	22.00	42.64	7.00	361.78	8.00	70.71	43.66	11.03
10	**-12	1.00	331.7	74.00	23.25	75.00	40.30	12.00	57.74	78.18	12.84
11	**-13	1.00	326.5	23.00	41.70	12.00	214.30	7.00	75.59	68.89	14.50
12	**-14	1.00	324.5	68.00	24.25	110.00	29.50	42.00	30.86	8.22	16.15
13	**-15	0.15	321.8	13.33	141.42	-6.67	1.E+06	0.00	0.00	84.90	16.91
		COUNT TERMINATED: COUNT RATE TOO LOW									
14	**-16	0.15	318.1	6.67	200.00	-20.00	0.00	20.00	115.47	59.47	17.69
		COUNT TERMINATED: COUNT RATE TOO LOW									
15	**-17	0.45	340.0	6.67	115.47	6.67	416.33	13.33	81.65	41.88	18.89
		COUNT TERMINATED: COUNT RATE TOO LOW									
16	**-18	0.15	338.7	0.00	0.00	-6.67	1.E+06	0.00	0.00	100.00	19.65
		COUNT TERMINATED: COUNT RATE TOO LOW									
MISSING SAMPLE											
18	**-2	1.00	343.9	25.00	40.00	27.00	99.47	12.00	57.74	70.59	21.55
MISSING SAMPLE											
20	**-4	1.00	369.3	18.00	47.14	61.00	48.00	8.00	70.71	85.94	23.25
21	**-5	1.00	358.3	13.00	55.47	37.00	74.57	10.00	63.25	89.12	24.91
22	**-6	1.00	357.7	22.00	42.64	38.00	72.80	4.00	100.00	79.49	26.59
23	**-7	1.00	337.6	18.00	47.14	6.00	420.76	11.00	60.30	64.91	28.24
24	**-8	0.15	339.2	6.67	200.00	13.33	282.84	0.00	0.00	100.00	29.14
		COUNT TERMINATED: COUNT RATE TOO LOW									
25	**-9	1.00	369.1	14.00	53.45	29.00	93.12	8.00	70.71	94.30	30.91
26	**-10	1.00	358.1	18.00	47.14	38.00	72.80	11.00	60.30	77.09	32.59
27	**-11	1.00	357.4	16.00	50.00	52.00	55.11	13.00	55.47	75.95	34.28
28	**-12	1.00	345.8	18.00	47.14	43.00	65.17	11.00	60.30	66.72	35.94

SAM NO	POS	TIME MIN	H#	3H CPM	3H %ERROR	14C CPM	14C %ERROR	32P CPM	32P %ERROR	LUMEX %	ELAPSED TIME
29	**-13	1.00	347.6	25.00	40.00	36.00	76.44	8.00	70.71	89.20	37.66
30	**-14	1.00	353.4	24.00	40.82	54.00	53.33	7.00	75.59	73.87	39.33
31	**-15	1.00	357.4	20.00	44.72	51.00	56.06	12.00	57.74	86.42	41.03
32	**-16	1.00	366.9	28.00	37.80	73.00	41.22	18.00	47.14	80.61	42.72
33	**-17	1.00	355.5	33.00	34.82	46.00	61.38	10.00	63.25	75.84	44.42
34	**-18	1.00	364.7	30.00	36.51	68.00	43.76	8.00	70.71	75.13	46.10
35	**-1	1.00	334.6	15.00	51.64	9.00	283.13	7.00	75.59	90.70	47.88
MISSING SAMPLE											
37	**-3	1.00	350.4	13.00	55.47	19.00	138.19	17.00	48.51	59.14	49.65
MISSING SAMPLE											
39	**-5	1.00	346.7	95.00	20.52	139.00	24.60	11.00	60.30	86.87	51.38
40	**-6	1.00	349.8	47.00	29.17	109.00	29.72	11.00	60.30	100.00	53.21
41	**-7	1.00	352.7	71.00	23.74	149.00	23.34	8.00	70.71	85.87	54.93
42	**-8	1.00	365.1	51.00	28.01	156.00	22.55	13.00	55.47	91.73	56.65
43	**-9	1.00	350.4	58.00	26.26	85.00	36.32	8.00	70.71	85.59	58.35
44	**-10	1.00	353.1	55.00	26.97	94.00	33.46	10.00	63.25	83.63	60.05
45	**-11	1.00	339.4	75.00	23.09	80.00	38.19	13.00	55.47	75.98	61.86
46	**-12	1.00	338.1	63.00	25.20	54.00	53.33	13.00	55.47	93.53	63.56
47	**-13	1.00	342.5	92.00	20.85	137.00	24.87	6.00	81.65	87.07	65.40
48	**-14	1.00	349.9	102.00	19.80	136.00	25.01	11.00	60.30	100.00	67.13
49	**-15	1.00	355.0	64.00	25.00	138.00	24.74	7.00	75.59	87.81	68.85
50	**-16	1.00	354.8	62.00	25.40	130.00	25.90	15.00	51.64	100.00	70.57
51	**-17	1.00	358.0	115.00	18.65	228.00	17.13	12.00	57.74	85.82	72.43
52	**-18	1.00	366.6	69.00	24.08	216.00	17.79	8.00	70.71	82.27	74.16
53	**-1	1.00	360.6	81.00	22.22	237.00	16.67	13.00	55.47	91.18	76.00
MISSING SAMPLE											
55	**-3	1.00	354.1	56.00	26.73	139.00	24.60	6.00	81.65	91.65	77.82
56	**-4	1.00	337.3	75.00	23.09	87.00	35.64	11.00	60.30	88.28	79.56
57	**-5	1.00	344.3	89.00	21.20	95.00	33.18	13.00	55.47	100.00	81.27
58	**-6	1.00	343.3	88.00	21.32	117.00	28.11	9.00	66.67	89.23	83.11
12	**-1	1.00	342.9	-2.42	1.E+06	-8.08	1.E+06	6.92	148.87	62.84	21.00
13	**-2	1.00	341.4	2.58	468.49	-16.08	1.E+06	1.92	483.92	73.33	22.57
14	**-3	1.00	343.3	10.58	126.23	9.92	179.64	1.92	483.92	69.19	24.17
15	**-4	1.00	341.2	9.58	137.83	12.92	140.50	-0.08	1.E+06	61.77	25.75
16	**-5	1.00	341.3	-4.42	1.E+06	-20.08	1.E+06	3.92	247.58	58.49	27.34
17	**-6	1.00	345.9	15.58	90.40	16.92	109.86	-2.08	1.E+06	74.70	28.92
18	**-7	1.00	342.5	14.58	95.63	3.92	437.31	-4.08	1.E+06	80.68	30.52
19	**-8	1.00	345.8	28.58	55.37	55.92	40.04	-4.08	1.E+06	71.74	32.12
20	**-9	1.00	346.3	9.58	137.83	18.92	99.37	-0.08	1.E+06	81.18	33.73
21	**-10	1.00	346.3	21.58	69.11	26.92	72.93	-4.08	1.E+06	74.26	35.31
22	**-11	1.00	339.4	-12.42	1.E+06	-27.08	1.E+06	-3.08	1.E+06	54.65	36.89
23	**-12	1.00	346.2	11.58	116.62	-1.08	1.E+06	2.92	325.31	76.40	38.47
24	**-1	1.00	343.8	19.58	74.78	20.92	90.88	0.92	988.03	79.39	40.20
25	**-2	1.00	347.7	35.58	46.90	58.92	38.46	-0.08	1.E+06	85.40	41.80
26	**-3	1.00	343.8	-1.42	1.E+06	-11.08	1.E+06	-5.08	1.E+06	68.30	43.39
27	**-4	1.00	344.5	2.58	468.49	-4.08	1.E+06	-0.08	1.E+06	66.07	44.97
28	**-5	1.00	347.5	11.58	116.62	26.92	72.93	-6.08	1.E+06	63.95	46.56
29	**-6	1.00	345.0	9.58	137.83	-2.08	1.E+06	-4.08	1.E+06	73.26	48.15
MISSING SAMPLE											
38	**-3	1.00	344.8	35.58	46.90	43.92	48.48	-12.08	1.E+06	89.16	50.17
39	**-4	1.00	388.3	-20.42	1.E+06	20.92	90.88	-4.08	1.E+06	81.01	51.85
40	**-5	1.00	357.4	-12.42	1.E+06	-10.08	1.E+06	-8.08	1.E+06	71.89	53.65
MISSING SAMPLE											
42	**-7	0.15	325.2	-31.42	0.00	-50.75	1.E+06	-11.42	1.E+06	100.00	54.44
COUNT TERMINATED: COUNT RATE TOO LOW											
43	**-8	1.00	323.9	-19.42	1.E+06	-44.08	1.E+06	-5.08	1.E+06	47.80	56.19
44	**-9	0.15	332.0	-31.42	0.00	-37.42	1.E+06	-18.08	0.00	99.02	57.07

SAM NO	POS	TIME MIN	H#	3H CPM	3H %ERROR	14C CPM	14C %ERROR	32P CPM	32P %ERROR	LUMEX %	ELAPSED TIME
		COUNT TERMINATED: COUNT RATE TOO LOW									
45	**-10	0.15	327.9	-18.08	1.E+06	-30.75	1.E+06	-18.08	0.00	78.26	57.88
		COUNT TERMINATED: COUNT RATE TOO LOW									
46	**-11	0.40	327.6	-23.92	1.E+06	-44.08	1.E+06	-5.58	1.E+06	72.67	58.90
		COUNT TERMINATED: COUNT RATE TOO LOW									
47	**-12	1.00	334.7	10.58	126.23	-22.08	1.E+06	-10.08	1.E+06	80.95	60.68
48	**-13	0.15	330.0	-18.08	1.E+06	-30.75	1.E+06	-18.08	0.00	86.56	61.48
		COUNT TERMINATED: COUNT RATE TOO LOW									
49	**-14	1.00	335.6	-8.42	1.E+06	-26.08	1.E+06	-4.08	1.E+06	72.21	63.15
50	**-15	1.00	324.4	-4.42	1.E+06	-49.08	1.E+06	-7.08	1.E+06	66.08	64.81
51	**-16	1.00	324.7	-12.42	1.E+06	-39.08	1.E+06	-8.08	1.E+06	58.70	66.48
52	**-17	1.00	331.5	-9.42	1.E+06	-31.08	1.E+06	-10.08	1.E+06	56.87	68.15
53	**-18	0.15	332.2	-31.42	0.00	-57.42	1.E+06	-4.75	1.E+06	100.00	68.93
		COUNT TERMINATED: COUNT RATE TOO LOW									
54	**-1	1.00	333.8	-10.42	1.E+06	-18.08	1.E+06	-7.08	1.E+06	53.87	70.70
55	**-2	0.15	324.2	-31.42	0.00	-50.75	1.E+06	-11.42	1.E+06	100.00	71.46
		COUNT TERMINATED: COUNT RATE TOO LOW									
56	**-3	1.00	327.7	-0.42	1.E+06	-38.08	1.E+06	-15.08	1.E+06	79.76	73.26
57	**-4	0.55	326.1	-11.42	1.E+06	-45.90	1.E+06	-10.81	1.E+06	76.29	74.44
		COUNT TERMINATED: COUNT RATE TOO LOW									
58	**-5	0.35	322.8	-25.70	1.E+06	-41.23	1.E+06	-6.65	1.E+06	80.92	75.44
		COUNT TERMINATED: COUNT RATE TOO LOW									
59	**-6	0.15	333.1	-18.08	1.E+06	-44.08	1.E+06	-18.08	0.00	100.00	76.23
		COUNT TERMINATED: COUNT RATE TOO LOW									
60	**-7	1.00	334.4	-13.42	1.E+06	-33.08	1.E+06	-4.08	1.E+06	71.95	77.90
61	**-8	1.00	328.1	5.58	225.47	-38.08	1.E+06	-5.08	1.E+06	51.04	79.65

NRC FORM 540 (5-1998) — US NUCLEAR REGULATORY COMMISSION

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

SHIPPING PAPER

1. EMERGENCY TELEPHONE NUMBER (INCLUDE AREA CODE)	(423) 599-9417
ORGANIZATION	US Ecology
2. IS THIS AN "EXCLUSIVE USE" SHIPMENT?	[X] YES [ ] NO
3. TOTAL NUMBER OF PACKAGES IDENTIFIED ON THIS MANIFEST	7
4. DOES EPA REGULATED WASTE REQUIRING A MANIFEST ACCOMPANY THIS SHIPMENT?	[ ] YES [X] NO
If "Yes," provide Manifest number	EPA MANIFEST NUMBER: N/A

5. SHIPPER NAME AND FACILITY	US Ecology for Roche Corporation 9115 Hague Road Indianapolis, IN 46250
SHIPPER ID #	N/A
	X COLLECTOR PROCESSOR
USER PERMIT NUMBER	N/A
SHIPMENT NUMBER	1
GENERATOR TYPE (SPECIFY)	
CONTACT	Jeff Regnier
TELEPHONE #	(423) 482-5532
6. CARRIER NAME AND ADDRESS	Dart Trucking Company, Inc. 61 Railroad Street Canfield, OH 44406
EPA ID #	N/A
SHIPPING DATE	03-15-99
CONTACT	Dean DeSantes
TELEPHONE #	(800) 541-8206
SIGNATURE-Authorized carrier acknowledging waste receipt	
DATE	03-15-99

7. NRC FORM 540 AND 540A — PAGE 1 OF	1 PAGE(S)
NRC FORM 541 AND 541A	3 PAGE(S)
NRC FORM 542 AND 542A	0 PAGE(S)
ADDITIONAL INFORMATION	PAGE(S)
8. Manifest Number (Use this number on all continuation pages)	99003
9. CONSIGNEE-NAME AND FACILITY ADDRESS	US Ecology 109 Flint Road Oak Ridge, TN 37830
Contact	John O'Neil
Telephone Number (Include area code)	(800) 567-2372
SIGNATURE-Authorized consignee acknowledging waste receipt	
Date	

10. Certification

This is to certify that the hazardous waste materials are properly classified, described, packaged, marked, and labeled and are in proper condition for transportation according to the applicable regulations of the Department of Transportation. This also certifies that the materials are classified, packaged, marked and labeled and are in proper condition for transportation and disposed as described in accordance with the applicable requirements of 10 CFR parts 20 and 61, or equivalent state regulations.

AUTHORIZED SIGNATURE: Karen Skerpel — TITLE: West RSO — DATE: 3/18/99

11. U.S. DEPARTMENT OF TRANSPORTATION DESCRIPTION (including proper shipping name, hazard class, UN/ID number, and any additional information)	12 DOT LABEL "RADIOACTIVE"	13 TRANSPORT INDEX	14 PHYSICAL AND CHEMICAL FORM	15 INDIVIDUAL RADIONUCLIDES			16 TOTAL PACKAGE ACTIVITY (MBq)	17 LSA/SCO CLASS	18. TOTAL WEIGHT OR VOLUME (Enter appropriate units)	19. ID NUMBER OF PACKAGE
Radioactive Material, Low Specific Activity, n.o.s., 7, UN 2912	NA	NA	Solid / Oxide	C-14, Co-57, H-3, I-125, P-32, P-33, S-35			2.33E+03	LSA-II	121 lbs. 54.9 kg	5
Radioactive Material, Low Specific Activity, n.o.s., 7, UN 2912	NA	NA	Solid / Oxide	C-14, Co-57, H-3, I-125, P-32, P-33, S-35			2.33E+03	LSA-II	127 lbs. 57.6 kg	6
Radioactive Material, Low Specific Activity, n.o.s., 7, UN 2912	NA	NA	Solid / Oxide	C-14, Co-57, H-3, I-125, P-32, P-33, S-35			2.33E+03	LSA-II	91 lbs. 41.3 kg	7
Radioactive Material, Low Specific Activity, n.o.s., 7, UN 2912	NA	NA	Solid / Oxide	C-14, Co-57, H-3, I-125, P-32, P-33, S-35, U-238			2.33E+03	LSA-II	96 lbs. 54.9 kg	9
Radioactive Material, Low Specific Activity, n.o.s., 7, UN 2912	NA	NA	Solid / Oxide	H-3, P-32			1.63E+03	LSA-II	99 lbs. 44.9 kg	8
Radioactive Material, Excepted Package - Limited Quantity of Material, 7, UN 2910	NA	NA	Solid / Oxide	S-35			1.72E+03	NA	184 lbs. 83.5 kg	1
Radioactive Material, Excepted Package - Limited Quantity of Material, 7, UN 2910	NA	NA	Solid / Oxide	S-35			3.70E+01	NA	101 lbs. 45.8 kg	4

FOR CONSIGNEE USE ONLY

For Above Package(s):

This package conforms to the conditions and limitations specified in 49CFR173.421 for Radioactive Material, Excepted Package - Limited Quantity of Material, UN 2910

NRC FORM 541
(5-1998)

US NUCLEAR REGULATORY COMMISSION

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST
CONTAINER AND WASTE DESCRIPTION

Additional Nuclear Regulatory Commission (NRC) Requirements for Control, Transfer and Disposal of Radioactive Waste

1. MANIFEST TOTALS

NUMBER OF PACKAGES/ DISPOSAL CONTAINERS	NET WASTE VOLUME (m3)	NET WASTE WEIGHT (kg)	SPECIAL NUCLEAR MATERIAL (grams) U-233	U-235	Pu	TOTAL
7	~~1.05~~ 1.47	255.9	NP	NP	NP	NP

ACTIVITY (MBq) ALL NUCLIDES	TRITIUM	C-14	Tc-99	I-129	SOURCE (kg)
1.27E+04	[illegible]	7.40E+02	NP	NP	[illegible]

2. MANIFEST NUMBER 99003

3. PAGE 1 OF 3 PAGE(S)

4. SHIPPER NAME US Ecology

SHIPPER ID NUMBER

DISPOSAL CONTAINER DESCRIPTION

5. CONTAINER IDENTIFICATION NUMBER/ GENERATOR NUMBER(S)	6. CONTAINER DESCRIPTION (See Note 1)	7. VOLUME (m3)	8. WASTE AND CONTAINER WEIGHT (kg)	9. SURFACE RADIATION LEVEL __ uSv/hr X mSv/hr	10. SURFACE CONTAMINATION MBq/100 cm2 ALPHA	BETA-GAMMA	11. WASTE DESCRIPTOR (See Note 2)	12. Approximate WASTE VOLUME(S) IN CONTAINER	13. SORBENT SOLIDIFICATION STABILIZATION MEDIA (See Note 3)	14. CHEMICAL FORM / CHELATING AGENT	WEIGHT % CHELATING AGENT IF > 0.1%	15. INDIVIDUAL RADIONUCLIDES AND ACTIVITY (MBq) AND CONTAINER TOTAL; OR CONTAINER TOTAL ACTIVITY AND RADIONUCLIDE PERCENT		16. WASTE CLASS AB-A STABLE AU-A UNSTABLE B-CLASS B C-CLASS C
5	4	0.21	54.9	<0.005	<3.34e-7	<1.67e-5	39 Compactible Trash	0.21	100 None Required	Oxide / NA	NA	C-14	1.85E+02	NA
												Co-57	3.70E+01	
												H-3	1.85E+02	
												I-125	1.85E+02	
												P-32	1.48E+03	
												P-33	7.40E+01	
												S-35	1.85E+02	
												TOTAL:	2.33E+03	
6	4	0.21	57.6	<0.005	<3.34e-7	<1.67e-5	39 Compactible Trash	0.21	100 None Required	Oxide / NA	NA	C-14	1.85E+02	NA
												Co-57	3.70E+01	
												H-3	1.85E+02	
												I-125	1.85E+02	
												P-32	1.48E+03	
												P-33	7.40E+01	
												S-35	1.85E+02	
												TOTAL:	2.33E+03	

NOTE 1: Container Description Codes. [illegible]

NOTE 2: Waste Descriptor Codes. [illegible]

NOTE 3: [illegible]

NRC FORM 541 (5-1998)

NRC FORM 541A (5-1998) — U.S. NUCLEAR REGULATORY COMMISSION

WASTE MANIFEST

CONTAINER AND WASTE DESCRIPTION (CONTINUATION)

2. MANIFEST NUMBER: 99003

3. PAGE 2 OF 3 PAGE(S)

DISPOSAL CONTAINER DESCRIPTION							WASTE DESCRIPTION FOR EACH WASTE TYPE IN CONTAINER							
							PHYSICAL DESCRIPTION			14. CHEMICAL DESCRIPTION		15. RADIOLOGICAL DESCRIPTION		
6. CONTAINER IDENTIFICATION NUMBER GENERATOR ID NUMBER(S)	6. CONTAINER DESCRIPTION (See Note 1)	7. VOLUME (m3)	8. WASTE AND CONTAINER WEIGHT (lbs)	9. SURFACE RADIATION LEVEL ___ mR/hr ___ R/hr	10. SURFACE CONTAMINATION MBq/100 cm2 ALPHA	10. SURFACE CONTAMINATION MBq/100 cm2 BETA-GAMMA	11. WASTE DESCRIPTION (See Note 2)	12. APPROXIMATE WASTE VOLUME(S) IN CONTAINER (m3)	13. SORBENT SOLIDIFICATION STABILIZATION MEDIA (See Note 3)	CHEMICAL FORM / CHELATING AGENT	WEIGHT % CHELATING AGENT IF > 0.1%	INDIVIDUAL RADIONUCLIDES AND ACTIVITY (MBq) AND CONTAINER TOTAL OR CONTAINER TOTAL ACTIVITY AND RADIONUCLIDE PERCENT		16. WASTE CLASSIFICATION A/B-CLASS A STABLE A1-CLASS A UNSTABLE B-CLASS B C-CLASS C
7	4	0.21	41.3	<0.005	<3.34e-7	<1.67e-5	39 Compactible Trash	0.21	100 None Required	Oxide / NA	NA	C-14 Co-57 H-3	1.85E+02 3.70E+01 1.85E+02	NA
												I-125 P-32 P-33	1.85E+02 1.48E+03 7.40E+01	
												S-35 TOTAL:	1.85E+02 2.33E+03	
9	4	0.21	54.9	<0.005	<3.34e-7	<1.67e-5	39 Compactible Trash	0.21	100 None Required	Oxide / NA	NA	C-14 Co-57 H-3	1.85E+02 3.70E+01 1.85E+02	NA
												I-125 P-32 P-33	1.85E+02 1.48E+03 7.40E+01	
												S-35 U-238 TOTAL:	1.85E+02 2.52E-01 (2.8E-02 kg) 2.33E+03	
8	4	0.21	44.9	<0.005	<3.34e-7	<1.67e-5	39 Compactible Trash	0.21	100 None Required	Oxide / NA	NA	H-3 P-32 TOTAL:	1.48E+02 1.48E+03 1.63E+03	NA

NRC FORM 541A (5-1998)

NRC FORM 541A
(5-1998)

US NUCLEAR REGULATORY COMMISSION

WASTE MANIFEST

CONTAINER AND WASTE DESCRIPTION (CONTINUATION)

2. MANIFEST NUMBER: 99003

3. PAGE 3 OF 3 PAGE(S)

DISPOSAL CONTAINER DESCRIPTION							WASTE DESCRIPTION FOR EACH WASTE TYPE IN CONTAINER							
							PHYSICAL DESCRIPTION			14. CHEMICAL DESCRIPTION		15. RADIOLOGICAL DESCRIPTION		
5. CONTAINER IDENTIFICATION NUMBER/ GENERATOR ID NUMBER(S)	6. CONTAINER DESCRIPTION (See Note 4)	7. VOLUME (m3)	8. WASTE AND CONTAINER WEIGHT (kg)	9. SURFACE RADIATION LEVEL (mrem/hr, millirad/hr)	10. SURFACE CONTAMINATION (MBq/100 cm2) ALPHA	BETA-GAMMA	11. WASTE DESCRIPTOR (See Note 2)	12. APPROXIMATE WASTE VOLUME(S) IN CONTAINER (m3)	13. SORBENT SOLIDIFICATION STABILIZATION MEDIA (See Note 3)	CHEMICAL FORM / CHELATING AGENT	WEIGHT % CHELATING AGENT IF > 0.1%	CONTAINER TOTAL OR CONTAINER TOTAL ACTIVITY AND RADIONUCLIDE PERCENT	INDIVIDUAL RADIONUCLIDES AND ACTIVITY (MBq) AND	16. WASTE CLASSIFICATION A/I-CLASS A STABLE A/U-CLASS A UNSTABLE B-CLASS B C-CLASS C
1	4	0.21	83.5	<0.005	<3.34e-7	<1.67e-5	39 Compactible Trash	0.21	100 None Required	Oxide / NA	NA	S-35	1.72E+03	NA
												TOTAL:	1.72E+03	
4	4	0.21	45.8	<0.005	<3.34e-7	<1.67e-5	39 Compactible Trash	0.21	100 None Required	Oxide / NA	NA	S-35	3.70E+01	NA
												TOTAL:	3.70E+01	

APPENDIX B (Page 1 of 1)
Radioactive Material. Excepted Package - Limited Quantity of Material Checklist
(49 CFR 173.421)

A. Total package activity does not exceed the limits specified in 49 CFR 173.425 (Table 7) "Materials Package Limits".

B. Attach Appendix E. 173.410 Strong Tight Container Checklist.

C. The package must be such that the radiation dose rate at any point on the external surface does not exceed 0.5 millirem per hour (0.005 mSv/hour).

D. External surfaces of the package shall not exceed the following limits for removable contamination.

Beta/gamma emitting radionuclides, and low toxicity alpha emitters -- 2,200 dpm/100 cm²
Other alpha emitting nuclides -- 220 dpm/100 cm²

E. The outside of the inner packaging or if there is no inner packaging, the outside of the packaging itself, shall bear the marking "RADIOACTIVE".

F. The package shall not contain more than 15 grams of U-235.

G. The following notice must be enclosed in or on the package, included with the packaging list or otherwise forwarded with the package. The notice must include the name of the consignor or consignee.

"This package conforms to the conditions and limitations specified in CFR 173.421 for Radioactive Material, excepted package - limited quantity of material, UN2910"

H. Packing material shall be sufficient to prevent shifting of the radioactive material

Package I.D. Number	A	B	C	D	E	F	G	H
1	✓		✓	✓	✓	✓	✓	✓
4	✓		✓	✓	✓	✓	✓	✓

1) List each package of Limited Quantity Material associated with the manifest listed below.
2) Place a circle in each grid which applies to that package.
3) Place a check mark inside each circle as that item is deemed complete or verified.

99003 — Manifest #

James E. Stanfield — Consignor

Mark Ziz 03-15-99 — Broker Signature/Date

APPENDIX J (Page 1 of 1)
Labeling Checklist (49 CFR 172.400)

Applicability: Type A or B Quantities of Radioactive Material or Radioactive Material LSA or SCO > A2 per Package

Transport Index	Maximum Radiation Level at any Point on the External Surface	Label Category[1]
Less than 0[2]	Less than or equal to 0.005 mSv/hr (0.5 mRem/hr)	White - I
More than 0 but not more than 1.0	Greater than 0.005 mSv/hr (0.5 mRem/hr) but less than or equal to 0.5 mSv/hr (50 mRem/hr)	Yellow - II
More than 1 but not more than 10	Greater than 0.5 mSv/hr (50 mRem/hr) but less than or equal to 2 mSv/hr (200 mRem/hr)	Yellow - III
More than 10	Greater than 2 mSv/hr (200 mRem/hr) but less than or equal to 10 mSv/hr (1,000 mRem/hr)	Yellow - III (Must be shipped exclusive use)

[1] Any package containing a "highway route controlled quantity" (173.403) must be labeled as RADIOACTIVE YELLOW - III.

[2] If the measured TI is not greater than 0.05, the value may be considered to be zero.

A. Information required on labels
   1. Contents from 49 CFR 173.435 in accordance with 49 CFR 173.433(f)
   2. Activity SI units or SI Units with customary units in parentheses
   3. Transport Index (Yellow II or Yellow III Labels only).

B. Subsidiary hazards (except Class 9 material) are within 6 inches of the primary hazard label.

C. One primary hazard label affixed to same surface as the proper shipping name marking.

D. Labels (primary and subsidiary) affixed on two opposite sides (other than the bottom)

Package I.D. Number	Measured T.I.	Max. Rad Level on External Surface	Label Selected	A	B	C	D
5	NA		Radioactive LSA				✓
6	NA		Radioactive LSA				✓
7	NA		Radioactive LSA				✓
9	NA		Radioactive LSA				✓
8	NA		Radioactive LSA				✓
1	NA		Radioactive				
4	NA		Radioactive				

1) List each package of Radioactive Material requiring specification labeling associated with the manifest listed below.
2) Place a circle in each grid which applies to that package.
3) Place a check mark inside each circle as that item is deemed complete or verified.

99003 — Manifest #

Rocle Corporation — Consignor

03-15-99 — Broker Signature/Date

APPENDIX M (Page 1 of 1)
Radiation/Contamination Level Checklist (49 CFR 173.441 and .443)

Package Limitations:

A. Contamination level: At the beginning of transportation, external surfaces shall not exceed the following limits for removable contamination.
- Beta/gamma emitting radionuclides, and low toxicity alpha emitters: 2200 dpm/100 cm
- Other alpha emitting nuclides: 220 dpm/100 cm²

B. Radiation level (check the appropriate limit):
___ Non exclusive use: Contact dose rate does not exceed 200 mRem/hour. TI does not exceed 10.0
___ Exclusive use - open vehicle: Contact dose rate does not exceed 200 mRem/hour.
✓ Exclusive use - closed vehicle: Contact dose rate does not exceed 1000 mRem/hour.

Vehicle Limitations

C. 200 mRem/hour on the vertical planes projected by the vehicle sides, top of the load (or enclosure if used), underside of the vehicle or to top, bottom and sides of a closed vehicle.

D. 10 mRem/hour at 2 meters from the vertical planes projected by the edge of the vehicle or sides of a closed vehicle.

E. 2 mRem/hour in any normally occupied space of the vehicle.

Package I.D. Number	Instrument Serial Number	Calibration Due Date	Source Check Completed	A	B	C	D	E
5				⊘	⊘			
6				⊘	⊘			
7				⊘	⊘			
9				⊘	⊘			
8				⊘	⊘			
1				⊘				
4				⊘				
Truck Post Loading						⊘	⊘	⊘

1) List each package of Radioactive Material associated with the manifest listed below.
2) Place a circle in each grid which applies to that package.
3) Place a check mark inside each circle as that item is deemed complete or verified.

99003 — Manifest #

Rocke Corporation — Consignor

[signature] 03-15-99 — Broker Signature/Date

NRC FORM 540 (5-1998) — US NUCLEAR REGULATORY COMMISSION

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

SHIPPING PAPER

1. EMERGENCY TELEPHONE NUMBER (INCLUDE AREA CODE)	(423) 599-9417
ORGANIZATION	US Ecology
2. IS THIS AN "EXCLUSIVE USE" SHIPMENT?	[x] YES [ ] NO
3. TOTAL NUMBER OF PACKAGES IDENTIFIED ON THIS MANIFEST	5
4. DOES EPA REGULATED WASTE REQUIRING A MANIFEST ACCOMPANY THIS SHIPMENT?	[ ] YES [X] NO
If "Yes," provide Manifest Number	N/A

5. SHIPPER- NAME AND FACILITY	US Ecology for Roche Corporation, 9115 Hague Road, Indianapolis, IN 96250
SHIPPER ID #	N/A
	X COLLECTOR / PROCESSOR
USER PERMIT NUMBER	N/A
SHIPMENT NUMBER	1
GENERATOR TYPE (SPECIFY)	
CONTACT	Jeff Regnier
TELEPHONE #	(423) 482-5532
6. CARRIER NAME AND ADDRESS	Dart Trucking Company, Inc., 61 Railroad Street, Canfield, OH 44406
EPA ID #	N/A
SHIPPING DATE	03-15-99
CONTACT	Dean DeSantes
TELEPHONE #	(800) 541-8206
SIGNATURE-Authorized carrier acknowledging waste receipt	Mark Fr
DATE	03-15-99

7. NRC FORM 540 AND 540A — PAGE 1 OF	1 PAGE(S)
NRC FORM 541 AND 541A	1 PAGE(S)
NRC FORM 542 AND 542A	2 PAGE(S)
ADDITIONAL INFORMATION	PAGE(S)
8. CONSIGNEE-NAME AND FACILITY ADDRESS	Perma-Fix of Florida, 1940 NW 67th Place, Gainesville, FL 32653
Contact	Raymond Whittle
Telephone Number (include area code)	(352) 373-6066
SIGNATURE-Authorized consignee acknowledging waste receipt	
Date	

8. Manifest Number (Use this number on all continuation pages): 99084

10. Certification

This is to certify that the herein named materials are properly classified described, packaged, marked, and labeled and are in proper condition for transportation according to the applicable regulations of the Department of Transportation. This also certifies that the materials are classified, packaged, marked and labeled and are in proper condition for transportation and disposal as described in accordance with the applicable requirements of 10 CFR parts 20 and 61, or equivalent state regulations.

AUTHORIZED SIGNATURE: [signature] TITLE: Asst RSO DATE: 3/15/99

11. U.S. DEPARTMENT OF TRANSPORTATION DESCRIPTION (including proper shipping name, hazard class, UN ID number, and any additional information)	12 DOT LABEL "RADIOACTIVE"	13 TRANSPORT INDEX	14 PHYSICAL AND CHEMICAL FORM	15 INDIVIDUAL RADIONUCLIDES		16 TOTAL PACKAGE ACTIVITY (MBq)	17 LSA/SCO CLASS	18. TOTAL WEIGHT OR VOLUME (Use appropriate units)	19. ID NUMBER OF PACKAGE
Radioactive Material, Low Specific Activity, n.o.s., 7, UN 2912	NA	NA	Liquid Scintillation Vials (Non-Hazardous, Regulated)	H-3, P-32		1.15E+03	LSA-II	161 lbs. 73.0 kg	10
Radioactive Material, Excepted Package - Limited Quantity of Material, 7, UN 2910	NA	NA	Liquid Scintillation Vials (Non-Hazardous, Regulated)	P-32		2.07E+01	NA	117 lbs. 53.1 kg	2
Radioactive Material, Excepted Package - Limited Quantity of Material, 7, UN 2910	NA	NA	Liquid Scintillation Vials (Non-Hazardous, Regulated)	P-32		1.25E+01	NA	192 lbs. 87.1 kg	3
Radioactive Material, Excepted Package - Limited Quantity of Material, 7, UN 2910	NA	NA	Liquid Scintillation Vials (Non-Hazardous, Regulated)	P-32		5.55E+00	NA	157 lbs. 71.2 kg	11
Radioactive Material, Excepted Package - Limited Quantity of Material, 7, UN 2910	NA	NA	Liquid Scintillation Vials (Non-Hazardous, Regulated)	P-32		5.55E+00	NA	87 lbs. 39.5 kg	12

FOR CONSIGNEE USE ONLY

For Above Package(s):

This package conforms to the conditions and limitations specified in 49CFR173.421 for Radioactive Material, Excepted Package - Limited Quantity of Material, UN 2910

PAGE 10

USECOLOGY

4234825605

02/17/1995 01:06

NRC FORM 541 (5-1998) — US NUCLEAR REGULATORY COMMISSION

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST
CONTAINER AND WASTE DESCRIPTION

Additional Nuclear Regulatory Commission (NRC) Requirements for Control, Transfer and Disposal of Radioactive Waste

1. MANIFEST TOTALS

Number of Packages/ Disposal Containers	Net Waste Volume (m3)	Net Waste Weight (kg)	Special Nuclear Material (grams) U-233	U-235	Pu	TOTAL
5	0.94 2.05 3-15-99	233.2	NP	NP	NP	NP

Activity (MBq) ALL NUCLIDES	TRITIUM	C-14	Tc-99	I-129	Source (kg)
1.15E+03	1.30E+01	NP	NP	NP	NP

2. MANIFEST NUMBER: 99004

3. PAGE 1 OF 1 PAGE(S)

4. SHIPPER NAME: US Ecology

SHIPPER ID NUMBER:

DISPOSAL CONTAINER DESCRIPTION

5. Container Identification Number Generator Number(s)	6. Container Description (See Note 1)	7. Volume (m3)	8. Waste and Container Weight (kg)	9. Surface Radiation Level ___ mR/hr _X_ mR/hr	10. Surface Contamination MBq/100 cm2 Alpha	Beta-Gamma	Physical Description 11. Waste Description (See Note 2)	12. Approximate Waste Volume(m3) in Container	13. Sorbent Solidification Stabilization MBSA (See Note 3)	14. Chemical Description Chemical Form / Chelating Agent	Weight % Chelating Agent (if > 0.1%)	15. Radiological Description Individual Radionuclides and Activity (MBq) and Container Total: or Container Total Activity and Radionuclide Percent		16. Waste Class A=A Stable A1=A Unstable B=Class B C=Class C
10	4 - OP	0.21	73.0	<0.005	<3.34e-7	<1.67e-5	59 Liquid Scintillation Vials	0.21	89 Other Vermiculite	Liquid Scintillation Vials / NA	NA	H-3 P-32	3.70E+01 1.11E+03	NA
												TOTAL:	1.15E+03	
2	4 - OP	0.21	53.1	<0.005	<3.34e-7	<1.67e-5	59 Liquid Scintillation Vials	0.21	89 Other Vermiculite	Liquid Scintillation Vials / NA	NA	P-32 TOTAL:	2.07E+01 2.07E+01	NA
3	4 - OP	0.21	87.1	<0.005	<3.34e-7	<1.67e-5	59 Liquid Scintillation Vials	0.21	89 Other Vermiculite	Liquid Scintillation Vials / NA	NA	P-32 TOTAL:	1.25E+01 1.25E+01	NA
11	4 - OP	0.21	71.2	<0.005	<3.34e-7	<1.67e-5	59 Liquid Scintillation Vials	0.21	89 Other Vermiculite	Liquid Scintillation Vials / NA	NA	P-32 TOTAL:	5.55E+00 5.55E+00	NA
12	4 - OP	~~0.21~~ 0.12 3-15-99	39.5	<0.005	<3.34e-7	<1.67e-5	59 Liquid Scintillation Vials	~~0.21~~ 0.12 3-15-99	89 Other Vermiculite	Liquid Scintillation Vials / NA	NA	P-32 TOTAL:	5.55E+00 5.55E+00	NA

NOTE 1: Container Description Codes. For non-disposal waste requiring disposal in approved disposal containers, the container code must be followed by "OP".

1. Wooden Box or Crate
2. Metal Box
3. Plastic Box or Pail
4. Metal Drum or Pail
5. Metal Tank or Liner
6. Concrete Type or Liner
7. Polyethylene Tank or Liner
8. Fiberglass Tank or Liner
9. Cardboard
10. Other Cylinder
11. Soft, Compactable Waste
12. Unpackaged Components
13. High Integrity Container
14. Other, describe in Item 6, or additional page

NOTE 2: Waste Description Codes. (Choose up to three which predominate by volume.)

20. Cleanup
21. Evaporator Ash
22. Sludge
23. Resin
24. Oil
25. Aqueous Liquid
26. Filter Media
27. Mechanical Filter
28. HEPA or Other Ventilation
29. Demolition Rubble
30. Cotton for Exchange Media
31. Activated Charcoal Exchange Media
32. Mixed Bed Ion Exchange Media
33. Contaminated Equipment
34. Organic Liquid (Except Oil)
35. Glassware or Labware
36. Sealed Source/Device
37. Paint or Plating
38. Evaporator Bottoms/Sludges/ Concentrates
39. Compactible Trash
40. Noncompactible Trash
41. Animal Carcass
42. Biological Material (Except Animal Carcass)
43. Activated Material
44. Other, Describe in Item 11, or Additional Page

NOTE 3: For solidification media that must dispose of to meet stability requirements, the materials code must be followed by "S".

For all solidification media, the waste (sorbent(s)) and liquid mass must also be identified in Item 13. Code 100 = NONE REQUIRED.

Sorbent

80. Cement Type I
81. Cement Type II
82. Pozzolanic
83. Solid-A-Sorb
84. Chemisorb 20
85. Chemisorb 30
86. Chemisorb HP200
87. Aquaset II
88. Other, Describe in Item 13, or additional page

Solidification

89. Cement
90. Concrete (Encapsulation)
91. Bitumen
92. Vinyl Chloride
93. Vinyl Ester Styrene
94. Other, Describe in Item 13, or Additional Page
95. None Required

NRC FORM 541 (5-1998)

APPENDIX B (Page 1 of 1)
Radioactive Material, Excepted Package - Limited Quantity of Material Checklist
(49 CFR 173.421)

A. Total package activity does not exceed the limits specified in 49 CFR 173.425 (Table 7) "Materials Package Limits".

B. Attach Appendix E. 173.410 Strong Tight Container Checklist.

C. The package must be such that the radiation dose rate at any point on the external surface does not exceed 0.5 millirem per hour (0.005 mSv/hour).

D. External surfaces of the package shall not exceed the following limits for removable contamination.

Beta/gamma emitting radionuclides, and low toxicity alpha emitters -- 2,200 dpm/100 cm^2
Other alpha emitting nuclides -- 220 dpm/100 cm^2

E. The outside of the inner packaging or if there is no inner packaging, the outside of the packaging itself, shall bear the marking "RADIOACTIVE".

F. The package shall not contain more than 15 grams of U-235.

G. The following notice must be enclosed in or on the package, included with the packaging list or otherwise forwarded with the package. The notice must include the name of the consignor or consignee.

"This package conforms to the conditions and limitations specified in CFR 173.421 for Radioactive Material, excepted package - limited quantity of material, UN2910"

H. Packing material shall be sufficient to prevent shifting of the radioacuve material

Package I.D. Number	A	B	C	D	E	F	G	H
2	✓		✓	✓	✓	✓	✓	✓
3	✓		✓	✓	✓	✓	✓	✓
11	✓		✓	✓	✓	✓	✓	✓
12	✓		✓	✓	✓	✓	✓	✓

1) List each package of Limited Quantity Material associated with the manifest listed below.
2) Place a circle in each grid which applies to that package.
3) Place a check mark inside each circle as that item is deemed complete or verified.

99004	Rocke Corporation	Mark Fl 03-15-99
Manifest #	Consignor	Broker Signature/Date

APPENDIX J (Page 1 of 1)
Labeling Checklist (49 CFR 172.400)

Applicability: Type A or B Quantities of Radioactive Material or Radioactive Material LSA or SCO > A2 per Package

Transport Index	Maximum Radiation Level at any Point on the External Surface	Label Category[1]
Less than 0[2]	Less than or equal to 0.005 mSv/hr (0.5 mRem/hr)	White - I
More than 0 but not more than 1.0	Greater than 0.005 mSv/hr (0.5 mRem/hr) but less than or equal to 0.5 mSv/hr (50 mRem/hr)	Yellow - II
More than 1 but not more than 10	Greater than 0.5 mSv/hr (50 mRem/hr) but less than or equal to 2 mSv/hr (200 mRem/hr)	Yellow - III
More than 10	Greater than 2 mSv/hr (200 mRem/hr) but less than or equal to 10 mSv/hr (1,000 mRem/hr)	Yellow - III (Must be shipped exclusive use)

[1] Any package containing a "highway route controlled quantity" (173.403) must be labeled as RADIOACTIVE YELLOW - III.

[2] If the measured TI is not greater than 0.05, the value may be considered to be zero.

A. Information required on labels
   1. Contents from 49 CFR 173.435 in accordance with 49 CFR 173.433(f)
   2. Activity SI units or SI Units with customary units in parentheses
   3. Transport Index (Yellow II or Yellow III Labels only).

B. Subsidiary hazards (except Class 9 material) are within 6 inches of the primary hazard label.

C. One primary hazard label affixed to same surface as the proper shipping name marking.

D. Labels (primary and subsidiary) affixed on two opposite sides (other than the bottom)

Package I.D. Number	Measured T.I.	Max. Rad Level on External Surface	Label Selected	A	B	C	D
10	NA		Radioactive LSA				○
2	NA		Radioactive				
3	NA		Radioactive				
11	NA		Radioactive				
12	NA		Radioactive				

1) List each package of Radioactive Material requiring specification labeling associated with the manifest listed below.
2) Place a circle in each grid which applies to that package.
3) Place a check mark inside each circle as that item is deemed complete or verified.

99004 — Manifest #

D. L. Cameron — Consignor

Mark Flynn 03-15-99 — Driver Signature

423-482-5760

APPENDIX E

Customer Service Questionnaire

In order that we may assist you as completely and efficiently as possible with your radiological shipment, we ask that you take a few moments to complete this questionnaire. Please call Christie Amos with Brokerage Services at (800) 888-8859 x285 if you have any questions concerning your shipment.

Section I (Administrative Information)

Shipper's Name: Roche Dx

Pick up Month: March

Shipper's Mailing Address: 9115 Hague Rd
Indpls IN 46250

Pick-up-Address:
(If Different)

Contact Person: Jeff Regnier
Phone Number: 317-576-2389

24 hour Emergency Phone #:

Shipper's EPA I.D.#:

South Carolina Permit #:

Section II (Waste Information) 11

Give as detailed a description of the waste as possible, using the following table. Please indicate all appropriate units.

Drum #	Drum Volume	Drum Weight (lbs)	Radionuclide(s) (Identify Each)	Activity (for each)	Highest Surface Dose Rate	Highest 1 meter Dose Rate	Stabilization Media	Hazardous Waste Codes	Contents (i.e., Compactible Trash, Incinerables, Sources, Scint LSVs, etc.) Liquid	Preferred Process/Disposal Option (i.e., Barnwell, E-Cure, Perma-Fix, NSSI, Compaction, Thermal, etc.)
11			P-32	150mCi					Scint	
1		80	S-35	46.6mCi					compactable Rad Waste	
2		144	P-32	560mCi					INCin Scint fl	
3		1975	P-32	338mCi					INCin Scint fl	
8			I-125	<3mCi					Compactable Rad Waste	
9			P-33	<2mCi					Rad Waste Compactable	
			Co-57	<1mCi					Rad Waste Compactable	
4			S-35	<1mCi					Rad Waste Compactable	
68			H-3	<4mCi					Rad Waste Compactable	
			P-32	<40mCi						
5, 6+7		535 Lbs	P-32 H3	5/29 <5mCi					Rad Waste Scintfluid	
10			P-32 H-3	<30mCi <1mCi						
60			C-60 H3 P-32 H3	<8mCi						

US Ecology
Brokerage Services

109 Flint Road
Oak Ridge, TN 37830
800-888-8859 ph
423-482-4776 fax

03-10-1999 10:59

P.02

9115

FORM 540 — ADCO SERVICES, INC.

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

SHIPPING PAPER

1. EMERGENCY TELEPHONE NUMBER *(Include Area Code)*: 317-521-3664

ORGANIZATION: ROCHE DIAGNOSTICS

2. IS THIS AN "EXCLUSIVE USE" SHIPMENT? [X] YES [ ] NO

3. TOTAL NUMBER OF PACKAGES IDENTIFIED ON THIS MANIFEST ===> 1

4. DOES EPA REGULATED WASTE REQUIRING A MANIFEST ACCOMPANY THIS SHIPMENT? If "Yes," provide Manifest Number ===> [ ] YES [X] NO

EPA MANIFEST NUMBER: NONE REQUIRED

5. SHIPPER – NAME AND FACILITY
ROCHE DIAGNOSTICS/FOR THE ACCOUNT OF
ADCO SERVICES, INC.
215 HAGUE ROAD
INDIANAPOLIS, IN 46250

SC PERMIT: NA

SHIPMENT NUMBER: 05-0468 C

CONTACT: TIM LONNEMAN

TELEPHONE NUMBER (Include Area Code): 317-521-3664

6. CARRIER – Name and Address
ADCOM EXPRESS, INC.
17650 DUVAN DRIVE
TINLEY PARK, IL 60477

CONTACT: BOB BASSETT

TELEPHONE NUMBER (Include Area Code): 708-429-3013

SIGNATURE – *Authorized carrier acknowledging waste receipt*

DATE

SHIPMENT I.D. NUMBER: 61138

[ ] COLLECTOR
[ ] PROCESSOR
[X] GENERATOR TYPE *(Specify)* I

EPA I.D. NUMBER: ILD 047267354

SHIPPING DATE: 12/9/05

7. FORM 540 AND 540A — PAGE 1 OF 1 PAGE(S)
FORM 541 AND 541A — 1 PAGE(S)
FORM 542 AND 542A — None PAGE(S)
ADDITIONAL INFORMATION — None PAGE(S)

8. MANIFEST NUMBER (Use this number on all continuation pages): 05-0468 C

9. CONSIGNEE - Name and Facility Address
ADCO SERVICES, INC.
17650 DUVAN DRIVE
TINLEY PARK, IL 60477

CONTACT: LEN WARBIANY/FACILITY MGR

TELEPHONE NUMBER (Include Area Code): 708-429-1660

SIGNATURE - *Authorized consignee acknowledging waste receipt*

DATE

10. CERTIFICATION

This is to certify that the herein-named materials are properly classified, described, packaged, marked, and labeled and are in proper condition for transportation according to the applicable regulations of the Department of Transportation. This also certifies that the materials are classified, packaged, marked, and labeled and are in proper condition for transportation and disposal as described in accordance with the requirements of 10 CFR Parts 20 and 61, or equivalent state regulations.

AUTHORIZED SIGNATURE | TITLE | DATE

11. U.S. DEPARTMENT OF TRANSPORTATION DESCRIPTION (Including proper shipping name, hazard class, UN ID number, and any additional information	12. DOT LABEL "RADIOACTIVE"	13. TRANSPORT INDEX	14. PHYSICAL AND CHEMICAL FORM	15. INDIVIDUAL RADIONUCLIDES		16. TOTAL PACKAGE ACTIVITY MBq	mCi	17. LSA/SCO CLASS	18. TOTAL WEIGHT OR VOLUME (Use appropriate units)	19. IDENTIFICATION NUMBER OF PACKAGE
Radioactive material, Type A Package, 7., UN 2915	NA	NA	Solid NORM WASTE	Th-232		8.1400E-04	2.2000E-05	NA	25. LBS; 1.4 FT3	05-0468-01

FOR CONSIGNEE USE ONLY

20. Check appropriate items:

___ Customer represents and warrants that all data set forth in this Uniform Low-Level Radioactive Manifest is true and correct in all respects.

___ Packages listed as "Limited Quantity of Radioactive Material" on this manifest conform to the conditions and limitations specified in 49 CFR 173.421 for radioactive material, excepted package-limited quantity of material UN2910

___ Packages listed as "NON-REGULATED MATERIAL" on this manifest are classified in accordance with 49 CFR 173.403 (Definition of Radioactive Material). These Materials must still be disposed of at a licensed facility.

FORM 540 (10-96)

FORM 541 — ADCO SERVICES, INC.

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

CONTAINER AND WASTE DESCRIPTION

Additional Nuclear Regulatory Commission (NRC) Requirements for Control, Transfer and Disposal of Radioactive Waste

1. MANIFEST TOTALS

NUMBER OF PACKAGES/ DISPOSAL CONTAINERS	NET WASTE VOLUME	NET WASTE WEIGHT	SPECIAL NUCLEAR MATERIAL (grams) U-233	U-235	Pu	TOTAL
1	m3 0.0396	kg 11.3398	NP	NP	NP	NP
	ft3 1.4000	lb 25.0000				

ACTIVITY	ALL NUCLIDES	TRITIUM	C-14	Tc-99	I-129	SOURCE	
MBq	8.1400E-04	NP	NP	NP	NP	(kgs)	2.0000E-04
mCi	2.2000E-05	NP	NP	NP	NP	(lbs)	4.4092E-04

2. MANIFEST NUMBER: 05-0468 C

3. PAGE 1 OF 1 PAGE(S)

4. SHIPPER NAME: ROCHE DIAGNOSTICS/FOR TH

SHIPMENT ID NUMBER: 61138

DISPOSAL CONTAINER DESCRIPTION							WASTE DESCRIPTION FOR EACH WASTE TYPE IN CONTAINER							16. WASTE CLASSIFICATION AS-Class A Stable AU-Class A Unstable B-Class B C-Class C
							PHYSICAL DESCRIPTION			14. CHEMICAL DESCRIPTION		15. RADIOLOGICAL DESCRIPTION		
5. CONTAINER IDENTIFICATION NUMBER / SC PERMIT	6. CONTAINER DESCRIPTION (See Note 1 & Note 1A)	7. VOLUME (m3) (ft3)	8. WASTE AND CONTAINER WEIGHT (kg) (lb)	9. SURFACE RADIATION LEVEL mSv/hr mrem/hr	10. SURFACE CONTAMINATION MBq/100 cm2 dpm/100 cm2 ALPHA	BETA-GAMMA	11. WASTE DESCRIPTOR (See Note 2 & Note 2A)	12. APPROXIMATE WASTE VOLUME(S) IN CONTAINER (m3) (FT3)	13. SOLIDIFICATION OR STABILIZATION MEDIA (See Note 3 & Note 3A)	CHEMICAL FORM/ CHELATING AGENT	WEIGHT % CHELATING AGENT (IF>0.1%	INDIVIDUAL RADIONUCLIDES AND ACTIVITY (MBq) AND CONTAINER TOTAL; OR CONTAINER TOTAL ACTIVITY AND RADIONUCLIDE PERCENT		
												RADIONUCLIDES	MBq	mCi
05-0468-01/B15 HAGUE ROAD INDIANAPOLIS, IN 46250	1B TYPE A PACKAGE / 1.4 CU FT	0.0396	11.3398		NP	NP	59-NORM WASTE-H	0.0396	89-POLYMER	NORM WASTE/NP	0.00	Th-232 [2.0000E-04 kgs]	8.1400E-04	2.2000E-05	NA
		1.4000	25.0000		NP	NP		1.4000				Subtotal	8.1400E-04	2.2000E-05	
												Total	8.1400E-04	2.2000E-05	
												Source: [2.0000E-04 kgs]			
Shipment Totals		0.0396	11.3398									Source: [2.0000E-04 kgs]	8.1400E-04	2.2000E-05	
		1.4000	25.0000												

NOTE 1: Container Description Codes. For containers/ waste requiring disposal in approved structural overpacks the numerical code must be followed by "-OP."

1. Wooden Box or Crate
2. Metal Box
3. Plastic Drum or Pail
4. Metal Drum or Pail
5. Metal Tank or Liner
6. Concrete Tank or Liner
7. Polyethlene Tank or Liner
8. Fiberglass Tank or Liner
9. Demineralizer
10. Gas Cylinder
11. Bulk, Unpackaged Waste
12. Unpackaged Components
13. High Integrity Container
18. Other. Describe in Item 8, or additional page.

Note 1A: Barnwell Specific Container Description Codes. (Choose one code as may be applicable.)

A High Integrity Container - Poly
B High Integrity Container - Poly with Steel Shell
C High Integrity Drum Overpack - Poly
D High Integrity Container - Stainless Steel
E High Integrity Container - Fiberglass
F Liner - Steel

NOTE 2: Waste Descriptor Codes. (Choose up to three which predominate by volume.)

20. Charcoal
21. Incinerator Ash
22. Soil
23. Gas
24. Oil
25. Aqueous Liquid
26. Filter Media
27. Mechanical Filter
28. EPA or State Hazardous
29. Demolition Rubble
30. Cation Ion-exchange Media
31. Anion Ion-exchange Media
32. Mixed Bed Ion-exchange Media
33. Contaminated Equipment
34. Organic Liquid (except oil)
35. Glassware or Labware
36. Sealed Source/Device
37. Paint or Plating
38. Evaporator Bottoms/Sludges/ Concentrates
39. Compactible Trash
40. Noncompactible Trash
41. Animal Carcass
42. Biological Material (except animal carcass)
43. Activated Material
59. Other. Describe in Item 11, or additional page

Note 2A: Barnwell Specific Waste Descriptor Codes (Choose all applicable codes.)

G Dewatered
H Solid
I Combustible
J Non-combustible
K Air Filtration Filters
L Asbestos

Note 3: Solidification and Stabilization Media Codes. (Choose up to three which predominate by volume.) For media meeting disposal site structural stability requirements, the numerical code must be followed by "-S" and the media vendor and brand name must also be identified in Item 13. Code 100=NONE REQUIRED.

Solidification
90. Cement
91. Concrete (encapsulation)
92. Bitumen
93. Vinyl Chloride
94. Vinyl Ester Styrene
99. Other. Describe in Item 13, or additional page
100. None Required.

Note 3A: Barnwell Specific Solidification and Stabilization Media Codes (Choose this code if applicable)

M Wax Binder

FORM 541 (10-96)

Shipper 05-5060

Carrier No.

Date 12-09-05

STRAIGHT BILL OF LADING

ORIGINAL – NOT NEGOTIABLE

ADCOM EXPRESS, INC.

TO:	FROM:
Consignee: **ADCO SERVICES, INC.** On collect or Delivery Shipments, the letters "COD" must appear before consignor's name or as otherwise provided in Item 430, Sec. 1.	Shipper: **ROCHE DIAGNOSTICS**
Street: **17650 DUVAN DRIVE**	Street: **915 HAGUE ROAD**
Destination: **TINLEY PARK, IL 60477**	Origin: **INDIANAPOLIS, IN 46250**

Vehicle Number

No. of Units & Container Type	HM	DESCRIPTION AND CLASSIFICATION (Proper Shipping Name, Class and Identification Number per 172.101, 172.202, 172.203)	TOTAL QUANTITY (Weight, Volume, Gallons, etc.)	WEIGHT (Subject to correction)
1 X 5 Gallon	X	Radioactive Material, Excepted Package, Articles Manufactured From Natural Uranium, 7., UN 2909 Isotope: U238 Activity: 2.479E-03 MBq (6.7000E-05 mCi) 0.0002 gm source material Surface Reading: mR/hr TI: Radioactive Label Applied:	0.68 cu ft	15 lbs
		ERG# 161		

PLACARDS TENDERED: NO

Shipper Certification: I hereby declare that the contents of this consignment are fully and accurately described by shipping name and are classified, packaged, marked and labeled, and are in all respects in proper condition for transport according to applicable international and national government regulations. _____ Signature	**EXCLUSIVE USE: YES** **24 Hour Emergency Contact Information:** Telephone Number: 317-521-3664 Contact: ROCHE DIAGNOSTICS
SHIPPER: ROCHE DIAGNOSTICS **PER** _____ **DATE:** 12-09-05	**CARRIER** Adcom Express, Inc. **PER** _____ **DATE:** 12-09-05

06-0343 N

FORM 540 — **ADCO SERVICES, INC.**

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

SHIPPING PAPER

1. EMERGENCY TELEPHONE NUMBER *(Include Area Code)*
~~317-521-3664~~ 1-800-535-5053

ORGANIZATION
ROCHE DIAGNOSTICS

2. IS THIS AN "EXCLUSIVE USE" SHIPMENT?
[X] YES
[ ] NO

3. TOTAL NUMBER OF PACKAGES IDENTIFIED ON THIS MANIFEST ==> 1

4. DOES EPA REGULATED WASTE REQUIRING A MANIFEST ACCOMPANY THIS SHIPMENT? [X] YES [ ] NO
If "Yes," provide Manifest Number ==>
EPA MANIFEST NUMBER
60343 /

5. SHIPPER -- NAME AND FACILITY
ROCHE DIAGNOSTICS
9115 HAGUE ROAD
INDIANAPOLIS, IN 46250

SC PERMIT
NA

SHIPMENT NUMBER
06-0343 N

CONTACT
TIM LONNEMAN

TELEPHONE NUMBER (Include Area Code)
317-521-3664

6. CARRIER -- Name and Address
ADCOM EXPRESS, INC.
17650 DUVAN DRIVE
TINLEY PARK, IL 60477

CONTACT
BOB BASSETT

SIGNATURE -- *Authorized carrier acknowledging waste receipt*

SHIPMENT I.D. NUMBER
61093

[ ] COLLECTOR
[ ] PROCESSOR
[X] GENERATOR TYPE *(Specify)* I

EPA I.D. NUMBER
ILD 047267364

SHIPPING DATE
~~10/18/06~~ 10/19/06

TELEPHONE NUMBER (Include Area Code)
708-429-3013

DATE
10/19/06

7. FORM 540 AND 540A — PAGE 1 OF 1 PAGE(S)
FORM 541 AND 541A — 1 PAGE(S)
FORM 542 AND 542A — None PAGE(S)
ADDITIONAL INFORMATION — None PAGE(S)

8. MANIFEST NUMBER (Use this number on all continuation pages)
06-0343 N

9. CONSIGNEE - Name and Facility Address
ADCO SERVICES, INC.
17650 DUVAN DRIVE
TINLEY PARK, IL 60477

CONTACT
LEN WARBIANY/FACILITY MGR

TELEPHONE NUMBER (Include Area Code)
708-429-1660

SIGNATURE - *Authorized consignee acknowledging waste receipt*

DATE

10. CERTIFICATION

This is to certify that the herein-named materials are properly classified, described, packaged, marked, and labeled and are in proper condition for transportation according to the applicable regulations of the Department of Transportation. This also certifies that the materials are classified, packaged, marked, and labeled and are in proper condition for transportation and disposal as described in accordance with the requirements of 10 CFR Parts 20 and 61, or equivalent state regulations.

AUTHORIZED SIGNATURE

TITLE
Environmental Specialist

DATE
10/19/06

11. U.S. DEPARTMENT OF TRANSPORTATION DESCRIPTION (Including proper shipping name, hazard class, UN ID number, and any additional information)	12. DOT LABEL "RADIOACTIVE"	13. TRANSPORT INDEX	14. PHYSICAL AND CHEMICAL FORM	15. INDIVIDUAL RADIONUCLIDES		16. TOTAL PACKAGE ACTIVITY MBq	mCi	17. LSA/SCO CLASS	18. TOTAL WEIGHT OR VOLUME (Use appropriate units)	19. IDENTIFICATION NUMBER OF PACKAGE
Waste,Flammable Liquid, n.o.s., (Ethanol), UN 1993 PG II	NA	NA	Liquid ETHANOL	H-3		2.9600E-01	8.0000E-03	NA	~~25. LBS~~; 1.4 FT3 (JL 18 LBS)	06-0343-01

FOR CONSIGNEE USE ONLY

20. Check appropriate items:

✓ Customer represents and warrents that all data set forth in this Uniform Low-Level Radioactive Manifest is true and correct in all respects.

___ Packages listed as "Limited Quantity of Radioactive Material" on this manifest conform to the conditions and limitations specified in 49 CFR 173.421 for radioactive material, excepted package-limited quantity of material UN2910

___ Packages listed as "NON-REGULATED MATERIAL" on this manifest are classified in accordance with 49 CFR 173.403 (Definition of Radioactive Material). These Materials must still be disposed of at a licensed facility.

FORM 540 (10-96)

FORM 541 | ADCO SERVICES, INC.

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

CONTAINER AND WASTE DESCRIPTION

Additional Nuclear Regulatory Commission (NRC) Requirements for Control, Transfer and Disposal of Radioactive Waste

1. MANIFEST TOTALS

NUMBER OF PACKAGES/ DISPOSAL CONTAINERS	NET WASTE VOLUME	NET WASTE WEIGHT	SPECIAL NUCLEAR MATERIAL (grams) U-233	U-235	Pu	TOTAL
1	m3 0.0396 / ft3 1.4000	kg 11.3398 / lb 25.0000	NP	NP	NP	NP

ACTIVITY	ALL NUCLIDES	TRITIUM	C-14	Tc-99	I-129	SOURCE	
MBq	2.9600E-01	2.9600E-01	NP	NP	NP	(kgs)	NA
mCi	8.0000E-03	8.0000E-03	NP	NP	NP	(lbs)	NA

2. MANIFEST NUMBER 06-0343 N

3. PAGE 1 OF 1 PAGE(S)

4. SHIPPER NAME ROCHE DIAGNOSTICS

SHIPMENT ID NUMBER 61093

DISPOSAL CONTAINER DESCRIPTION							WASTE DESCRIPTION FOR EACH WASTE TYPE IN CONTAINER							
							PHYSICAL DESCRIPTION			14. CHEMICAL DESCRIPTION		15. RADIOLOGICAL DESCRIPTION			16. WASTE CLASSIFICATION AS-Class A Stable AU-Class A Unstable B-Class B C-Class C
5. CONTAINER IDENTIFICATION NUMBER / SC PERMIT	6. CONTAINER DESCRIPTION (See Note 1 & Note 1A)	7. VOLUME (m3) / (ft3)	8. WASTE AND CONTAINER WEIGHT (kg) / (lb)	9. SURFACE RADIATION LEVEL mSv/hr / mrem/hr	10. SURFACE CONTAMINATION MBq/100 cm2 / dpm/100 cm2 ALPHA	BETA-GAMMA	11. WASTE DESCRIPTOR (See Note 2 & Note 2A)	12. APPROXIMATE WASTE VOLUME(S) IN CONTAINER (m3) / (FT3)	13. SOLIDIFICATION OR STABILIZATION MEDIA (See Note 3 & Note 3A)	CHEMICAL FORM/ CHELATING AGENT	WEIGHT % CHELATING AGENT IF>0.1%	INDIVIDUAL RADIONUCLIDES AND ACTIVITY (MBq) AND CONTAINER TOTAL; OR CONTAINER TOTAL ACTIVITY AND RADIONUCLIDE PERCENT: RADIONUCLIDES	MBq	mCi	
06-0343-01/9115 HAGUE ROAD INDIANAPOLIS, IN 46250	4	0.0396	11.3398	3.0000E-04	NP	NP	59-C3-RAD BULK/ORGANIC-I	0.0396	62	ETHANOL/NP	0.00	H-3	2.9600E-01	8.0000E-03	NA
		1.4000	25.0000	3.0000E-02	NP	NP		1.4000				Subtotal	2.9600E-01	8.0000E-03	
												Total	2.9600E-01	8.0000E-03	
Shipment Totals		0.0396	11.3398										2.9600E-01	8.0000E-03	
		1.4000	25.0000												

NOTE 1: Container Description Codes. For containers/ waste requiring disposal in approved structural over-packs the numerical code must be followed by "-OP."

1. Wooden Box or Crate
2. Metal Box
3. Plastic Drum or Pail
4. Metal Drum or Pail
5. Metal Tank or Liner
6. Concrete Tank or Liner
7. Polyethlene Tank or Liner
8. Fiberglass Tank or Liner
9. Demineralizer
10. Gas Cylinder
11. Bulk, Unpackaged Waste
12. Unpackaged Components
13. High Integrity Container
19. Other. Describe in Item 6, or additional page.

Note 1A: Barnwell Specific Container Description Codes. (Choose one code as may be applicable.)

A High Integrity Container - Poly
B High Integrity Container - Poly with Steel Shell
C High Integrity Drum Overpack - Poly
D High Integrity Container - Stainless Steel
E High Integrity Container - Fiberglass
F Liner - Steel

NOTE 2: Waste Descriptor Codes. (Choose up to three which predominate by volume.)

20. Charcoal
21. Incinerator Ash
22. Soil
23. Gas
24. Oil
25. Aqueous Liquid
26. Filter Media
27. Mechanical Filter
28. EPA or State Hazardous
29. Demolition Rubble
30. Cation Ion-exchange Media
31. Anion Ion-exchange Media
32. Mixed Bed Ion-exchange Media
33. Contaminated Equipment
34. Organic Liquid (except oil)
35. Glassware or Labware
36. Sealed Source/Device
37. Paint or Plating
38. Evaporator Bottoms/Sludges/ Concentrates
39. Compactible Trash
40. Noncompactible Trash
41. Animal Carcass
42. Biological Material (except animal carcass)
43. Activated Material
59. Other. Describe in Item 11, or additional page

Note 2A: Barnwell Specific Waste Descriptor Codes (Choose all applicable codes.)

G Dewatered
H Solid
I Combustible
J Non-combustible
K Air Filtration Filters
L Asbestos

Note 3: Solidification and Stabilization Media Codes. (Choose up to three which predominate by volume.) For media meeting disposal site structural stability requirements, the numerical code must be followed by "-S" and the media vendor and brand name must also be identified in Item 13. Code 100=NONE REQUIRED.

Solidification

90. Cement
91. Concrete (encapsulation)
92. Bitumen
93. Vinyl Chloride
94. Vinyl Ester Styrene
99. Other. Describe in Item 13, or additional page
100. None Required.

Note 3A: Barnwell Specific Solidification and Stabilization Media Codes (Choose this code if applicable)

M Wax Binder

FORM 541 (10-96)

060344 P

FORM 540 — ADCO SERVICES, INC.

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

SHIPPING PAPER

EMERGENCY TELEPHONE NUMBER (Include Area Code): ~~317-521-3664~~ 1-800-535-5053

ORGANIZATION: ROCHE DIAGNOSTICS

2. IS THIS AN "EXCLUSIVE USE" SHIPMENT? [X] YES [ ] NO

3. TOTAL NUMBER OF PACKAGES IDENTIFIED ON THIS MANIFEST =====> 1

4. DOES EPA REGULATED WASTE REQUIRING A MANIFEST ACCOMPANY THIS SHIPMENT? [ ] YES [X] NO
If "Yes," provide Manifest Number =====>

EPA MANIFEST NUMBER: NA

5. SHIPPER -- NAME AND FACILITY
ROCHE DIAGNOSTICS/ FOR THE ACCT OF
ADCO SERVICES, INC.
9115 HAGUE ROAD
INDIANAPOLIS, IN 46250

SC PERMIT: NA

SHIPMENT NUMBER: 06-0344 P

CONTACT: TIM LONNEMAN

TELEPHONE NUMBER (Include Area Code): 317-521-3664

6. CARRIER -- Name and Address
ADCOM EXPRESS, INC.
17650 DUVAN DRIVE
TINLEY PARK, IL 60477

EPA I.D. NUMBER: ILD 047267364

SHIPPING DATE: ~~10/18/06~~ 10/19/06

CONTACT: BOB BASSETT

TELEPHONE NUMBER (Include Area Code): 708-429-3013

SIGNATURE – *Authorized carrier acknowledging waste receipt*

DATE: 10/19/06

SHIPMENT I.D. NUMBER: 61093

[ ] COLLECTOR
[ ] PROCESSOR
[X] GENERATOR TYPE (Specify) 1

7. FORM 540 AND 540A — PAGE 1 OF 1 PAGE(S)
FORM 541 AND 541A — 1 PAGE(S)
FORM 542 AND 542A — None PAGE(S)
ADDITIONAL INFORMATION — None PAGE(S)

8. MANIFEST NUMBER (Use this number on all continuation pages): 06-0344 P

9. CONSIGNEE - Name and Facility Address
ADCO SERVICES, INC.
17650 DUVAN DRIVE
TINLEY PARK, IL 60477

CONTACT: LEN WARBIANY/FACILITY MGR

TELEPHONE NUMBER (Include Area Code): 708-429-1660

SIGNATURE - *Authorized consignee acknowledging waste receipt*

DATE

10. CERTIFICATION

This is to certify that the herein-named materials are properly classified, described, packaged, marked, and labeled and are in proper condition for transportation according to the applicable regulations of the Department of Transportation. This also certifies that the materials are classified, packaged, marked, and labeled and are in proper condition for transportation and disposal as described in accordance with the requirements of 10 CFR Parts 20 and 61, or equivalent state regulations.

AUTHORIZED SIGNATURE: Timothy Lonneman

TITLE: Environmental Specialist

DATE: 10/19/06

11. U.S. DEPARTMENT OF TRANSPORTATION DESCRIPTION (Including proper shipping name, hazard class, UN ID number, and any additional information	12. DOT LABEL "RADIOACTIVE"	13. TRANSPORT INDEX	14. PHYSICAL AND CHEMICAL FORM	15. INDIVIDUAL RADIONUCLIDES		16. TOTAL PACKAGE ACTIVITY MBq	mCi	17. LSA/SCO CLASS	18. TOTAL WEIGHT OR VOLUME (Use appropriate units)	19. IDENTIFICATION NUMBER OF PACKAGE
Deregulated Scintillation Fluids (as per 10 CFR 20.2005)	NA	NA	Liquid BIODEGRADABLE	H-3		3.7000E-01	1.0000E-02	NA	~~25. LBS.~~ 1.4 FT3 27LBS (JX)	06-0344-01

FOR CONSIGNEE USE ONLY

20. Check appropriate items:

___ Customer represents and warrents that all data set forth in this Uniform Low-Level Radioactive Manifest is true and correct in all respects.

___ Packages listed as "Limited Quantity of Radioactive Material" on this manifest conform to the conditions and limitations specified in 49 CFR 173.421 for radioactive material, excepted package-limited quantity of material UN2910

___ Packages listed as "NON-REGULATED MATERIAL" on this manifest are classified in accorance with 49 CFR 173.403 (Definition of Radioactive Material). These Materials must still be disposed of at a licensed facility.

FORM 540 (10-96)

FORM 541 | ADCO SERVICES, INC.

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

CONTAINER AND WASTE DESCRIPTION

Additional Nuclear Regulatory Commission (NRC) Requirements for Control, Transfer and Disposal of Radioactive Waste

1. MANIFEST TOTALS

NUMBER OF PACKAGES/ DISPOSAL CONTAINERS	NET WASTE VOLUME	NET WASTE WEIGHT	SPECIAL NUCLEAR MATERIAL (grams) U-233	U-235	Pu	TOTAL
1	m3 0.0396 / ft3 1.4000	kg 11.3398 / lb 25.0000	NP	NP	NP	NP

ACTIVITY	ALL NUCLIDES	TRITIUM	C-14	Tc-99	I-129	SOURCE
MBq	3.7000E-01	3.7000E-01	NP	NP	NP	(kgs) NA
mCi	1.0000E-02	1.0000E-02	NP	NP	NP	(lbs) NA

2. MANIFEST NUMBER 06-0344 P

3. PAGE 1 OF 1 PAGE(S)

4. SHIPPER NAME ROCHE DIAGNOSTICS/ FOR TH

SHIPMENT ID NUMBER 61093

DISPOSAL CONTAINER DESCRIPTION | WASTE DESCRIPTION FOR EACH WASTE TYPE IN CONTAINER

5. CONTAINER IDENTIFICATION NUMBER / SC PERMIT	6. CONTAINER DESCRIPTION (See Note 1 & Note 1A)	7. VOLUME (m3) (ft3)	8. WASTE AND CONTAINER WEIGHT (kg) (lb)	9. SURFACE RADIATION LEVEL mSv/hr mrem/hr	10. SURFACE CONTAMINATION MBq/100 cm2 dpm/100 cm2 ALPHA	BETA-GAMMA	11. WASTE DESCRIPTOR (See Note 2 & Note 2A)	12. APPROXIMATE WASTE VOLUME(S) IN CONTAINER (m3) (FT3)	13. SOLIDIFICATION OR STABILIZATION MEDIA (See Note 3 & Note 3A)	14. CHEMICAL DESCRIPTION CHEMICAL FORM/ CHELATING AGENT	WEIGHT % CHELATING AGENT IF>0.1%	15. RADIOLOGICAL DESCRIPTION RADIONUCLIDES	MBq	mCi	16. WASTE CLASSIFICATION AS-Class A Stable AU-Class A Unstable B-Class B C-Class C
06-0344-01/9115 HAGUE ROAD INDIANAPOLIS, IN 46250	4	0.0396	11.3398	3.0000E-04	NP	NP	59-C1-DEREG VIALS/BIODEGRADABLE -J	0.0396	100	BIODEGRADABLE/ NP	0.00	H-3	3.7000E-01	1.0000E-02	NA
		1.4000	25.0000	3.0000E-02	NP	NP		1.4000				Subtotal	3.7000E-01	1.0000E-02	
												Total	3.7000E-01	1.0000E-02	
Shipment Totals		0.0396	11.3398										3.7000E-01	1.0000E-02	
		1.4000	25.0000												

NOTE 1: Container Description Codes. For containers/ waste requiring disposal in approved structural over-packs the numerical code must be followed by "-OP."

1. Wooden Box or Crate
2. Metal Box
3. Plastic Drum or Pail
4. Metal Drum or Pail
5. Metal Tank or Liner
6. Concrete Tank or Liner
7. Polyethlene Tank or Liner
8. Fiberglass Tank or Liner
9. Demineralizer
10. Gas Cylinder
11. Bulk, Unpackaged Waste
12. Unpackaged Components
13. High Integrity Container
19. Other, Describe in Item 6, or additional page.

Note 1A: Barnwell Specific Container Description Codes. (Choose one code as may be applicable.)

A High Integrity Container - Poly
B High Integrity Container - Poly with Steel Shell
C High Integrity Drum Overpack - Poly
D High Integrity Container - Stainless Steel
E High Integrity Container - Fiberglass
F Liner - Steel

NOTE 2: Waste Descriptor Codes. (Choose up to three which predominate by volume.)

20. Charcoal
21. Incinerator Ash
22. Soil
23. Gas
24. Oil
25. Aqueous Liquid
26. Filter Media
27. Mechanical Filter
28. EPA or State Hazardous
29. Demolition Rubble
30. Cation Ion-exchange Media
31. Anion Ion-exchange Media
32. Mixed Bed Ion-exchange Media
33. Contaminated Equipment
34. Organic Liquid (except oil)
35. Glassware or Labware
36. Sealed Source/Device
37. Paint or Plating
38. Evaporator Bottoms/Sludges/ Concentrates
39. Compactible Trash
40. Noncompactible Trash
41. Animal Carcass
42. Biological Material (except animal carcass)
43. Activated Material
59. Other. Describe in Item 11, or additional page

Note 2A: Barnwell Specific Waste Descriptor Codes (Choose all applicable codes.)

G Dewatered
H Solid
I Combustible
J Non-combustible
K Air Filtration Filters
L Asbestos

Note 3: Solidification and Stabilization Media Codes. (Choose up to three which predominate by volume.) For media meeting disposal site structural stability requirements, the numerical code must be followed by "-S" and the media vendor and brand name must also be identified in Item 13. Code 100=NONE REQUIRED.

Solidification

90. Cement
91. Concrete (encapsulation)
92. Bitumen
93. Vinyl Chloride
94. Vinyl Ester Styrene
99. Other. Describe in Item 13, or additional page
100. None Required.

Note 3A: Barnwell Specific Solidification and Stabilization Media Codes (Choose this code if applicable)

M Wax Binder

FORM 541 (10-96)

06-0345L

FORM 540 — ADCO SERVICES, INC.

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

SHIPPING PAPER

EMERGENCY TELEPHONE NUMBER (Include Area Code): ~~847-621-3664~~ 1-800-535-5053

ORGANIZATION: ROCHE DIAGNOSTICS

2. IS THIS AN "EXCLUSIVE USE" SHIPMENT? [X] YES [ ] NO

3. TOTAL NUMBER OF PACKAGES IDENTIFIED ON THIS MANIFEST ======> 1

4. DOES EPA REGULATED WASTE REQUIRING A MANIFEST ACCOMPANY THIS SHIPMENT? [ ] YES [X] NO
If "Yes," provide Manifest Number ======>

EPA MANIFEST NUMBER: NA

5. SHIPPER -- NAME AND FACILITY
ROCHE DIAGNOSTICS / FOR THE ACCT OF
ADCO SERVICES, INC.
9115 HAGUE ROAD
INDIANAPOLIS, IN 46250

SC PERMIT: NA

SHIPMENT NUMBER: 06-0345 L

CONTACT: TIM LONNEMAN

6. CARRIER -- Name and Address
ADCOM EXPRESS, INC.
17650 DUVAN DRIVE
TINLEY PARK, IL 60477

CONTACT: BOB BASSETT

SIGNATURE -- *Authorized carrier acknowledging waste receipt*

SHIPMENT I.D. NUMBER: 61093

[ ] COLLECTOR
[ ] PROCESSOR
[X] GENERATOR TYPE (Specify) I

TELEPHONE NUMBER (Include Area Code): 317-521-3664

EPA I.D. NUMBER: ILD 047267364

SHIPPING DATE: ~~10/18/06~~ 10/19/06

TELEPHONE NUMBER (Include Area Code): 708-429-3013

DATE: 10/19/06

7. FORM 540 AND 540A — PAGE 1 OF 1 PAGE(S)
FORM 541 AND 541A — 1 PAGE(S)
FORM 542 AND 542A — None PAGE(S)
ADDITIONAL INFORMATION — None PAGE(S)

9. CONSIGNEE - Name and Facility Address
ADCO SERVICES, INC.
17650 DUVAN DRIVE
TINLEY PARK, IL 60477

SIGNATURE - *Authorized consignee acknowledging waste receipt*

8. MANIFEST NUMBER (Use this number on all continuation pages): 06-0345 L

CONTACT: LEN WARBIANY/FACILITY MGR

TELEPHONE NUMBER (Include Area Code): 708-429-1660

DATE

10. CERTIFICATION

This is to certify that the herein-named materials are properly classified, described, packaged, marked, and labeled and are in proper condition for transportation according to the applicable regulations of the Department of Transportation. This also certifies that the materials are classified, packaged, marked, and labeled and are in proper condition for transportation and disposal as described in accordance with the requirements of 10 CFR Parts 20 and 61, or equivalent state regulations.

AUTHORIZED SIGNATURE | TITLE: Environmental Specialist | DATE: 10/19/06

11. U.S. DEPARTMENT OF TRANSPORTATION DESCRIPTION (Including proper shipping name, hazard class, UN ID number, and any additional information)	12. DOT LABEL "RADIOACTIVE"	13. TRANSPORT INDEX	14. PHYSICAL AND CHEMICAL FORM	15. INDIVIDUAL RADIONUCLIDES		16. TOTAL PACKAGE ACTIVITY MBq	mCi	17. LSA/SCO CLASS	18. TOTAL WEIGHT OR VOLUME (Use appropriate units)	19. IDENTIFICATION NUMBER OF PACKAGE
NON-REGULATED MATERIAL (In accordance with 49 CFR 173.403 - defintion of radioactive material)	NA	NA	Solid PAPER PLASTIC GLASS	H-3		1.8500E+00	5.0000E-02	NA	~~100. LBS; 4.1 FT3~~ 22 LBS, 1.4 FT3 (JK)	06-0345-01

FOR CONSIGNEE USE ONLY

20. Check appropriate items:

✓ Customer represents and warrants that all data set forth in this Uniform Low-Level Radioactive Manifest is true and correct in all respects.

___ Packages listed as "Limited Quantity of Radioactive Material" on this manifest conform to the conditions and limitations specified in 49 CFR 173.421 for radioactive material, excepted package-limited quantity of material UN2910

✓ Packages listed as "NON-REGULATED MATERIAL" on this manifest are classified in accorance with 49 CFR 173.403 (Definition of Radioactive Material). These Materials must still be disposed of at a licensed facility.

FORM 540 (10-98)

FORM 541 ADCO SERVICES, INC.

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

CONTAINER AND WASTE DESCRIPTION

Additional Nuclear Regulatory Commission (NRC) Requirements for Control, Transfer and Disposal of Radioactive Waste

1. MANIFEST TOTALS

NUMBER OF PACKAGES/ DISPOSAL CONTAINERS	NET WASTE VOLUME	NET WASTE WEIGHT	SPECIAL NUCLEAR MATERIAL (grams) U-233	U-235	Pu	TOTAL
1	m3 0.1161 / ft3 ~~4.1000~~ 4.1	kg 45.3592 / lb 100.0000	NP	NP	NP	NP

ACTIVITY	ALL NUCLIDES	TRITIUM	C-14	Tc-99	I-129	SOURCE	
MBq	1.8500E+00	1.8500E+00	NP	NP	NP	(kgs)	NA
mCi	5.0000E-02	5.0000E-02	NP	NP	NP	(lbs)	NA

2. MANIFEST NUMBER 06-0345 L

3. PAGE 1 OF 1 PAGE(S)

4. SHIPPER NAME ROCHE DIAGNOSTICS / FOR T

SHIPMENT ID NUMBER 61093

DISPOSAL CONTAINER DESCRIPTION							WASTE DESCRIPTION FOR EACH WASTE TYPE IN CONTAINER							16. WASTE CLASSIFICATION AS-Class A Stable AU-Class A Unstable B-Class B C-Class C
							PHYSICAL DESCRIPTION			14. CHEMICAL DESCRIPTION		15. RADIOLOGICAL DESCRIPTION		
5. CONTAINER IDENTIFICATION NUMBER / SC PERMIT	6. CONTAINER DESCRIPTION (See Note 1 & Note 1A)	7. VOLUME (m3) (ft3)	8. WASTE AND CONTAINER WEIGHT (kg) (lb)	9. SURFACE RADIATION LEVEL mSv/hr mrem/hr	10. SURFACE CONTAMINATION MBq/100 cm2 dpm/100 cm2 ALPHA	BETA-GAMMA	11. WASTE DESCRIPTOR (See Note 2 & Note 2A)	12. APPROXIMATE WASTE VOLUME(S) IN CONTAINER (m3) (FT3)	13. SOLIDIFICATION OR STABILIZATION MEDIA (See Note 3 & Note 3A)	CHEMICAL FORM/ CHELATING AGENT	WEIGHT % CHELATING AGENT IF>0.1%	INDIVIDUAL RADIONUCLIDES AND ACTIVITY (MBq) AND CONTAINER TOTAL; OR CONTAINER TOTAL ACTIVITY AND RADIONUCLIDE PERCENT		
												RADIONUCLIDES	MBq	mCi
08-0345-01/8115 HAGUE ROAD INDIANAPOLIS, IN 46250	4	~~0.1161~~ 0.1161	45.3592	3.0000E-04	NP	NP	39-H	0.1161	100	PAPER PLASTIC GLASS/NP	0.00	H-3	1.8500E+00	5.0000E-02
		1.4 ~~4.1000~~	100.0000	3.0000E-02	NP	NP		4.1000				Subtotal	1.8500E+00	5.0000E-02
												Total	1.8500E+00	5.0000E-02
Shipment Totals		~~0.1161~~ 0.1161	45.3592										1.8500E+00	5.0000E-02
		1.4 ~~4.1000~~	100.0000											

NOTE 1: Container Description Codes. For containers/ waste requiring disposal in approved structural over-packs the numerical code must be followed by "-OP."

1. Wooden Box or Crate
2. Metal Box
3. Plastic Drum or Pail
4. Metal Drum or Pail
5. Metal Tank or Liner
6. Concrete Tank or Liner
7. Polyethlene Tank or Liner
8. Fiberglass Tank or Liner
9. Demineralizer
10. Gas Cylinder
11. Bulk, Unpackaged Waste
12. Unpackaged Components
13. High Integrity Container
19. Other. Describe in Item 6, or additional page.

Note 1A: Barnwell Specific Container Description Codes. (Choose one code as may be applicable.)

A High Integrity Container - Poly
B High Integrity Container - Poly with Steel Shell
C High Integrity Drum Overpack - Poly
D High Integrity Container - Stainless Steel
E High Integrity Container - Fiberglass
F Liner - Steel

NOTE 2: Waste Descriptor Codes. (Choose up to three which predominate by volume.)

20. Charcoal
21. Incinerator Ash
22. Soil
23. Gas
24. Oil
25. Aqueous Liquid
26. Filter Media
27. Mechanical Filter
28. EPA or State Hazardous
29. Demolition Rubble
30. Cation Ion-exchange Media
31. Anion Ion-exchange Media
32. Mixed Bed Ion-exchange Media
33. Contaminated Equipment
34. Organic Liquid (except oil)
35. Glassware or Labware
36. Sealed Source/Device
37. Paint or Plating
38. Evaporator Bottoms/Sludges/ Concentrates
39. Compactible Trash
40. Noncompactible Trash
41. Animal Carcass
42. Biological Material (except animal carcass)
43. Activated Material
59. Other. Describe in Item 11, or additional page

Note 2A: Barnwell Specific Waste Descriptor Codes (Choose all applicable codes.)

G Dewatered
H Solid
I Combustible
J Non-combustible
K Air Filtration Filters
L Asbestos

Note 3: Solidification and Stabilization Media Codes. (Choose up to three which predominate by volume.) For media meeting disposal site structural stability requirements, the numerical code must be followed by "-S" and the media vendor and brand name must also be identified in Item 13. Code 100=NONE REQUIRED.

Solidification

90. Cement
91. Concrete (encapsulation)
92. Bitumen
93. Vinyl Chloride
94. Vinyl Ester Styrene
99. Other. Describe in Item 13, or additional page
100. None Required.

Note 3A: Barnwell Specific Solidification and Stabilization Media Codes (Choose this code if applicable)

M Wax Binder

FORM 541 (10-96)

08-0117 V

FORM 540 — **ADCO SERVICES, INC.**

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

SHIPPING PAPER

1. EMERGENCY TELEPHONE NUMBER *(Include Area Code)*: ~~317-924-8684~~ (IX) 317-902-9868

ORGANIZATION: ROCHE DIAGNOSTICS / Tom Schumacher

2. IS THIS AN "EXCLUSIVE USE" SHIPMENT? [X] YES [ ] NO

3. TOTAL NUMBER OF PACKAGES IDENTIFIED ON THIS MANIFEST =====> 1

4. DOES EPA REGULATED WASTE REQUIRING A MANIFEST ACCOMPANY THIS SHIPMENT? [ ] YES [X] NO
If "Yes," provide Manifest Number =====>

EPA MANIFEST NUMBER: NA

5. SHIPPER -- NAME AND FACILITY
ROCHE DIAGNOSTICS/FOR THE ACCOUNT OF ADCO SERVICES
9115 HAGUE ROAD
INDIANAPOLIS, IN 46250

SC PERMIT: N/A

SHIPMENT NUMBER: 08-0117 V

CONTACT: TIM LONNEMAN

6. CARRIER -- Name and Address
ADCOM EXPRESS, INC.
17650 DUVAN DRIVE
TINLEY PARK, IL 60477

CONTACT: ROBERT W. BASSETT

SIGNATURE -- *Authorized carrier acknowledging waste receipt*: Bob Thompson

SHIPMENT ID. NUMBER: 61517

[ ] COLLECTOR
[ ] PROCESSOR
[X] GENERATOR TYPE *(Specify)* I

TELEPHONE NUMBER (Include Area Code): 317-521-3664

EPA I.D. NUMBER: ILD047267364

SHIPPING DATE: 2/21/08

TELEPHONE NUMBER (Include Area Code): 708-429-3013

DATE: 2/21/08

7. FORM 540 AND 540A — PAGE 1 OF 1 PAGE(S)
FORM 541 AND 541A — 1 PAGE(S)
FORM 542 AND 542A — None PAGE(S)
ADDITIONAL INFORMATION — None PAGE(S)

8. MANIFEST NUMBER (Use this number on all continuation pages): 08-0117 V

9. CONSIGNEE - Name and Facility Address
ADCO SERVICES, INC.
17650 DUVAN DRIVE
TINLEY PARK, IL 60477

CONTACT: LEN WARBIANY-FAC MGR

TELEPHONE NUMBER (Include Area Code): 708-429-1660

SIGNATURE - *Authorized consignee acknowledging waste receipt*

DATE

10. CERTIFICATION

This is to certify that the herein-named materials are properly classified, described, packaged, marked, and labeled and are in proper condition for transportation according to the applicable regulations of the Department of Transportation. This also certifies that the materials are classified, packaged, marked, and labeled and are in proper condition for transportation and disposal as described in accordance with the requirements of 10 CFR Parts 20 and 61, or equivalent state regulations.

AUTHORIZED SIGNATURE: Timothy Lonneman

TITLE: Environmental Specialist

DATE: 2/21/08

11. U.S. DEPARTMENT OF TRANSPORTATION DESCRIPTION (Including proper shipping name, hazard class, UN ID number, and any additional information)	12. DOT LABEL "RADIOACTIVE"	13. TRANSPORT INDEX	14. PHYSICAL AND CHEMICAL FORM	15. INDIVIDUAL RADIONUCLIDES		16. TOTAL PACKAGE ACTIVITY MBq	mCi	17. LSA/SCO CLASS	18. TOTAL WEIGHT OR VOLUME (Use appropriate units)	19. IDENTIFICATION NUMBER OF PACKAGE
DOT EXEMPT	NA	NA	Liquid BIODEGRADABLE	H-3	S-35	1.4800E-01	4.0000E-03	NA	10. LBS; 0.7 FT3	08-0117-01

FOR CONSIGNEE USE ONLY

20. Check appropriate items:

___ Customer represents and warrants that all data set forth in this Univorm Low-Level Radioactive Manifest is true and correct in all respects.

___ Packages listed as "Limited Quantity of Radioactive Material" on this manifest conform to the conditions and limitations specified in 49 CFR 173.421 for radioactive material, excepted package-limited quantity of material UN2910

___ Packages listed as "NON-REGULATED MATERIAL" on this manifest are classified in accorance with 49 CFR 173.403 (Definition of Radioactive Material). These Materials bust still be disposed of at a licensed facility.

FORM 540 (10-98)

FORM 541 ADCO SERVICES, INC.

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

CONTAINER AND WASTE DESCRIPTION

Additional Nuclear Regulatory Commission (NRC) Requirements for Control, Transfer and Disposal of Radioactive Waste

1. MANIFEST TOTALS

NUMBER OF PACKAGES/ DISPOSAL CONTAINERS	NET WASTE VOLUME		NET WASTE WEIGHT		SPECIAL NUCLEAR MATERIAL (grams) U-233	U-235	Pu	TOTAL
1	m3	0.0198	kg	4.5359	NP	NP	NP	NP
	ft3	0.7000	lb	10.0000				

ACTIVITY	ALL NUCLIDES	TRITIUM	C-14	Tc-99	I-129	SOURCE	
MBq	1.4800E-01	7.4000E-02	NP	NP	NP	(kgs)	NA
mCi	4.0000E-03	2.0000E-03	NP	NP	NP	(lbs)	NA

2. MANIFEST NUMBER 08-0117 V

3. PAGE 1 OF 1 PAGE(S)

4. SHIPPER NAME ROCHE DIAGNOSTICS/FOR TH

SHIPMENT ID NUMBER 61517

DISPOSAL CONTAINER DESCRIPTION | **WASTE DESCRIPTION FOR EACH WASTE TYPE IN CONTAINER**

5. CONTAINER IDENTIFICATION NUMBER / SC PERMIT	6. CONTAINER DESCRIPTION (See Note 1 & Note 1A)	7. VOLUME (m3) (ft3)	8. WASTE AND CONTAINER WEIGHT (kg) (lb)	9. SURFACE RADIATION LEVEL mSv/hr mrem/hr	10. SURFACE CONTAMINATION MBq/100 cm2 dpm/100 cm2 ALPHA	BETA-GAMMA	11. WASTE DESCRIPTOR (See Note 2 & Note 2A)	PHYSICAL DESCRIPTION 12. APPROXIMATE WASTE VOLUME(S) IN CONTAINER (m3) (FT3)	13. SOLIDIFICATION OR STABILIZATION MEDIA (See Note 3 & Note 3A)	14. CHEMICAL DESCRIPTION CHEMICAL FORM/ CHELATING AGENT	WEIGHT % CHELATING AGENT IF>0.1%	15. RADIOLOGICAL DESCRIPTION INDIVIDUAL RADIONUCLIDES AND ACTIVITY (MBq) AND CONTAINER TOTAL; OR CONTAINER TOTAL ACTIVITY AND RADIONUCLIDE PERCENT RADIONUCLIDES	MBq	mCi	16. WASTE CLASSIFICATION AS-Class A Stable AU-Class A Unstable B-Class B C-Class C
08-0117-01/NA 9115 HAGUE ROAD INDIANAPOLIS, IN 46256	3	0.0198	4.5359	0.005	NP	NP	59-C1 - DEREG VIALS / BIODEGRADABLE-J	0.0198	62	BIODEGRADABLE/ NP	0.00	H-3	3.7000E-02	1.0000E-03	NA
		0.7000	10.0000	0.5	NP	NP		0.7000				H-3	3.7000E-02	1.0000E-03	
												S-35	3.7000E-02	1.0000E-03	
												S-35	3.7000E-02	1.0000E-03	
												Subtotal	1.4800E-01	4.0000E-03	
												Total	1.4800E-01	4.0000E-03	
Shipment Totals		0.0198	4.5359										1.4800E-01	4.0000E-03	
		0.7000	10.0000												

NOTE 1: Container Description Codes. For containers/ waste requiring disposal in approved structural over-packs the numerical code must be followed by "-OP."

1. Wooden Box or Crate
2. Metal Box
3. Plastic Drum or Pail
4. Metal Drum or Pail
5. Metal Tank or Liner
6. Concrete Tank or Liner
7. Polyethlene Tank or Liner
8. Fiberglass Tank or Liner
9. Demineralizer
10. Gas Cylinder
11. Bulk, Unpackaged Waste
12. Unpackaged Components
13. High Integrity Container
18. Other. Describe in Item 6, or additional page.

Note 1A: Barnwell Specific Container Description Codes. (Choose one code as may be applicable.)

A High Integrity Container - Poly
B High Integrity Container - Poly with Steel Shell
C High Integrity Drum Overpack - Poly
D High Integrity Container - Stainless Steel
E High Integrity Container - Fiberglass
F Liner - Steel

NOTE 2: Waste Descriptor Codes. (Choose up to three which predominate by volume.)

20. Charcoal
21. Incinerator Ash
22. Soil
23. Gas
24. Oil
25. Aqueous Liquid
26. Filter Media
27. Mechanical Filter
28. EPA or State Hazardous
29. Demolition Rubble
30. Cation Ion-exchange Media
31. Anion Ion-exchange Media
32. Mixed Bed Ion-exchange Media
33. Contaminated Equipment
34. Organic Liquid (except oil)
35. Glassware or Labware
36. Sealed Source/Device
37. Paint or Plating
38. Evaporator Bottoms/Sludges/ Concentrates
39. Compactible Trash
40. Noncompactible Trash
41. Animal Carcass
42. Biological Material (except animal carcass)
43. Activated Material
59. Other. Describe in Item 11, or additional page

Note 2A: Barnwell Specific Waste Descriptor Codes (Choose all applicable codes.)

G Dewatered
H Solid
I Combustible
J Non-combustible
K Air Filtration Filters
L Asbestos

Note 3: Solidification and Stabilization Media Codes. (Choose up to three which predominate by volume.) For media meeting disposal site structural stability requirements, the numerical code must be followed by "-S" and the media vendor and brand name must also be identified in Item 13. Code 100=NONE REQUIRED.

Solidification
90. Cement
91. Concrete (encapsulation)
92. Bitumen
93. Vinyl Chloride
94. Vinyl Ester Styrene
99. Other. Describe in Item 13, or additional page
100. None Required.

Note 3A: Barnwell Specific Solidification and Stabilization Media Codes (Choose this code if applicable)

M Wax Binder

FORM 541 (10-96)

09-0117 C

FORM 540 — ADCO SERVICES, INC.

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

SHIPPING PAPER

1. EMERGENCY TELEPHONE NUMBER (Include Area Code): 317-716-6071
ORGANIZATION: ROCHE DIAGNOSTICS

2. IS THIS AN "EXCLUSIVE USE" SHIPMENT? [X] YES [ ] NO

3. TOTAL NUMBER OF PACKAGES IDENTIFIED ON THIS MANIFEST ======> 1

4. DOES EPA REGULATED WASTE REQUIRING A MANIFEST ACCOMPANY THIS SHIPMENT? [ ] YES [X] NO
If "Yes," provide Manifest Number ======>
EPA MANIFEST NUMBER: NA

5. SHIPPER – NAME AND FACILITY
ROCHE DIAGNOSTICS
/FOR THE ACCT OF ADCO SERVICE.
9115 HAGUE ROAD
INDIANAPOLIS, IN 46250

SC PERMIT: NA
SHIPMENT NUMBER: 09-0117 C
CONTACT: TIM LONNEMAN
TELEPHONE NUMBER (Include Area Code): 317-716-6071

6. CARRIER – Name and Address
ADCOM EXPRESS, INC.
17650 DUVAN DRIVE
TINLEY PARK, IL 60477
CONTACT: ROBERT BASSETT
SIGNATURE – *Authorized carrier acknowledging waste receipt*: Lee Warbiany

SHIPMENT I.D. NUMBER: 61517
[ ] COLLECTOR
[ ] PROCESSOR
[X] GENERATOR TYPE (Specify) I

EPA I.D. NUMBER: ILD047267364
SHIPPING DATE: 5/4/09
TELEPHONE NUMBER (Include Area Code): 708-429-3013
DATE: 5-6-09

7. FORM 540 AND 540A — PAGE 1 OF 1 PAGE(S)
FORM 541 AND 541A — 1 PAGE(S)
FORM 542 AND 542A — None PAGE(S)
ADDITIONAL INFORMATION — None PAGE(S)

8. MANIFEST NUMBER (Use this number on all continuation pages): 09-0117 C

9. CONSIGNEE - Name and Facility Address
ADCO SERVICES, INC.
17650 DUVAN DRIVE
TINLEY PARK, IL 60477

CONTACT: LEN WARBIANY/FACILITY MGR
TELEPHONE NUMBER (Include Area Code): 708-429-1660
SIGNATURE - *Authorized consignee acknowledging waste receipt*:
DATE:

10. CERTIFICATION
This is to certify that the herein-named materials are properly classified, described, packaged, marked, and labeled and are in proper condition for transportation according to the applicable regulations of the Department of Transportation. This also certifies that the materials are classified, packaged, marked, and labeled and are in proper condition for transportation and disposal as described in accordance with the requirements of 10 CFR Parts 20 and 61, or equivalent state regulations.

AUTHORIZED SIGNATURE: [signature]
TITLE: Environmental Specialist
DATE: 5-6-09

11. U.S. DEPARTMENT OF TRANSPORTATION DESCRIPTION (Including proper shipping name, hazard class, UN ID number, and any additional information)	12. DOT LABEL "RADIOACTIVE"	13. TRANSPORT INDEX	14. PHYSICAL AND CHEMICAL FORM	15. INDIVIDUAL RADIONUCLIDES		16. TOTAL PACKAGE ACTIVITY MBq	mCi	17. LSA/SCO CLASS	18. TOTAL WEIGHT OR VOLUME (Use appropriate units)	19. IDENTIFICATION NUMBER OF PACKAGE
UN2910 Radioactive material, excepted package-limited quantity of material, 7	NA	NA	Solid N.O.R.M. WASTE	U-238		1.5401E-01	4.1625E-03	NA	25. LBS; 1.4 FT3	09-0117-01

FOR CONSIGNEE USE ONLY
#18 ACTUAL VOLUME OF MATERIAL 1.25 FT3
5-6-09

20.

FORM 540 (10-96)

641

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

CONTAINER AND WASTE DESCRIPTION

Additional Nuclear Regulatory Commission (NRC) Requirements for Control, Transfer and Disposal of Radioactive Waste

1. MANIFEST TOTALS

NUMBER OF PACKAGES/ DISPOSAL CONTAINERS	NET WASTE VOLUME	NET WASTE WEIGHT	SPECIAL NUCLEAR MATERIAL (grams) U-233	U-235	Pu	TOTAL
1	m3 INC..	kg 1.4000	NP	NP	NP	NP
	ft3 0.0396	lb 11.3398				

ACTIVITY	ALL NUCLIDES	TRITIUM	C-14	Tc-99	I-129	SOURCE	
MBq	1.5401E-01	NP	NP	NP	NP	(kgs)	1.2500E-02
mCi	4.1625E-03	NP	NP	NP	NP	(lbs)	2.7558E-02

2. MANIFEST NUMBER 09-0117 C

3. PAGE 1 OF 1 PAGE(S)

4. SHIPPER NAME ROCHE DIAGNOSTICS

SHIPMENT ID NUMBER 61517

DISPOSAL CONTAINER DESCRIPTION							WASTE DESCRIPTION FOR EACH WASTE TYPE IN CONTAINER						16. WASTE CLASSIFICATION AS-Class A Stable AU-Class A Unstable B-Class B C-Class C
					PHYSICAL DESCRIPTION					14. CHEMICAL DESCRIPTION		15. RADIOLOGICAL DESCRIPTION	
5. CONTAINER IDENTIFICATION NUMBER /	6. CONTAINER DESCRIPTION (See Note 1 & Note 1A)	7. VOLUME (m3) (ft3)	8. WASTE AND CONTAINER WEIGHT (kg) (lb)	9. SURFACE RADIATION LEVEL mSv/hr mrem/hr	10. SURFACE CONTAMINATION MBq/100 cm2 dpm/100 cm2 ALPHA	BETA-GAMMA	11. WASTE DESCRIPTOR (See Note 2 & Note 2A)	12. APPROXIMATE WASTE VOLUME(S) IN CONTAINER (m3) (FT3)	13. SOLIDIFICATION OR STABILIZATION MEDIA (See Note 3 & Note 3A)	CHEMICAL FORM/ CHELATING AGENT	WEIGHT % CHELATING AGENT IF>0.1%	INDIVIDUAL RADIONUCLIDES AND ACTIVITY (MBq) AND CONTAINER TOTAL; OR CONTAINER TOTAL ACTIVITY AND RADIONUCLIDE PERCENT	
												RADIONUCLIDES	MBq / mCi
09-0117-01/NA 9115 HAGUE ROAD INDIANAPOLIS, IN 46250	4	0.0396	11.3398		NP	NP	59-NORM WASTE-H	0.0396	100	N.O.R.M. WASTE/NP	0.00	U-238 [1.2500E-02 kgs]	1.5401E-01 / 4.1625E-03
		1.4000	25.0000		NP	NP		1.4000				Subtotal	1.5401E-01 / 4.1625E-03
												Total	1.5401E-01 / 4.1625E-03
												Source: [1.2500E-02 kgs]	
Shipment Totals		0.0396	11.3398									Source: [1.2500E-02 kgs]	1.5401E-01 / 4.1625E-03
		1.4000	25.0000										

NOTE 1: Container Description Codes. For containers/ waste requiring disposal in approved structural overpacks the numerical code must be followed by "-OP."

1. Wooden Box or Crate
2. Metal Box
3. Plastic Drum or Pail
4. Metal Drum or Pail
5. Metal Tank or Liner
6. Concrete Tank or Liner
7. Polyethlene Tank or Liner
8. Fiberglass Tank or Liner
9. Demineralizer
10. Gas Cylinder
11. Bulk, Unpackaged Waste
12. Unpackaged Components
13. High Integrity Container
19. Other. Describe in item 8, or additional page.

Note 1A: Barnwell Specific Container Description Codes. (Choose one code as may be applicable.)

A High Integrity Container - Poly
B High Integrity Container - Poly with Steel Shell
C High Integrity Drum Overpack - Poly
D High Integrity Container - Stainless Steel
E High Integrity Container - Fiberglass
F Liner - Steel

NOTE 2: Waste Descriptor Codes. (Choose up to three which predominate by volume.)

20. Charcoal
21. Incinerator Ash
22. Soil
23. Gas
24. Oil
25. Aqueous Liquid
26. Filter Media
27. Mechanical Filter
28. EPA or State Hazardous
29. Demolition Rubble
30. Cation Ion-exchange Media
31. Anion Ion-exchange Media
32. Mixed Bed Ion-exchange Media
33. Contaminated Equipment
34. Organic Liquid (except oil)
35. Glassware or Labware
36. Sealed Source/Device
37. Paint or Plating
38. Evaporator Bottoms/Sludges/ Concentrates
39. Compactible Trash
40. Noncompactible Trash
41. Animal Carcass
42. Biological Material (except animal carcass)
43. Activated Material
59. Other. Describe in item 11, or additional page

Note 2A: Barnwell Specific Waste Descriptor Codes (Choose all applicable codes.)

G Dewatered
H Solid
I Combustible
J Non-combustible
K Air Filtration Filters
L Asbestos

Note 3: Solidification and Stabilization Media Codes. (Choose up to three which predominate by volume.) For media meeting disposal site structural stability requirements, the numerical code must be followed by "-S" and the media vendor and brand name must also be identified in Item 13. Code 100=NONE REQUIRED.

Solidification
90. Cement
91. Concrete (encapsulation)
92. Bitumen
93. Vinyl Chloride
94. Vinyl Ester Styrene
99. Other. Describe in item 13, or additional page
100. None Required.

Note 3A: Barnwell Specific Solidification and Stabilization Media Codes (Choose this code if applicable)

M Wax Binder

FORM 541 (10-96)

FORM 540 — Energy Solutions/Bear Creek

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST

SHIPPING PAPER

1. EMERGENCY TELEPHONE NUMBER (include Area Code)
800-424-9300

ORGANIZATION
Chemtrec obo Philotechnics, Ltd.

2. IS THIS AN "EXCLUSIVE USE" SHIPMENT?
[ ] YES
[X] NO

3. TOTAL NUMBER OF PACKAGES IDENTIFIED ON THIS MANIFEST → 1

4. DOES EPA REGULATED WASTE REQUIRING A MANIFEST ACCOMPANY THIS SHIPMENT? [ ] YES [X] NO
If "Yes", provide Manifest Number →

EPA MANIFEST NUMBER
N/A

5. SHIPPER - NAME AND FACILITY
Philotechnics @ Roche Diagnostics
9115 Hague Rd.
Indianapolis, IN 46250

USER PERMIT NUMBER
T-TN024-D11

SHIPMENT NUMBER
1823-020411EN

CONTACT
Tim Lonnemann

SHIPMENT ID NUMBER
T110505

[X] COLLECTOR
[ ] PROCESSOR
[ ] GENERATOR TYPE (Specify)

TELEPHONE NUMBER (include Area Code)
(317) 521-4592

6. CARRIER - Name and Address
Philotechnics, Ltd
201 Renovare Blvd.
Oak Ridge, TN 37830

Truck #:
Trailer #:

EPA I.D. NUMBER
TNR000030544

SHIPPING DATE
02/04/2011

CONTACT
Allen Neal

TELEPHONE NUMBER (include Area Code)
(865) 964-0054

SIGNATURE - Authorized carrier acknowledging waste receipt [signature]

DATE 2-4-11

7. FORM 540 AND 540A — PAGE 1 OF 1 PAGE(S)
FORM 541 AND 541A — 1 PAGE(S)
FORM 542 AND 542A — 1 PAGE(S)
ADDITIONAL INFORMATION — None PAGE(S)

8. MANIFEST NUMBER (Use this number on all continuation pages)
T110505

9. CONSIGNEE - Name and Facility Address
Energy Solutions/Bear Creek
Operated By Energy Solutions
1560 Bear Creek Road
Oak Ridge, TN 37830

CONTACT
Donnie Brackett

TELEPHONE NUMBER (include Area Code)
(865) 220-1629

SIGNATURE - Authorized consignee acknowledging waste receipt [signature]

DATE 2/4/11

Cust# 2284 — Shp# T110505

10. CERTIFICATION
This is to certify that the herein-named materials are properly classified, described, packaged, marked, and labeled and are in proper condition for transportation according to the applicable regulations of the Department of Transportation. This also certifies that the materials are classified, packaged, marked, and labeled and in proper condition for transportation and disposal in accordance with the requirements of 10 CFR Parts 20 and 61, or equivalent state regulation.

AUTHORIZED SIGNATURE [signature] — **TITLE** Broker — **DATE** 2-4-11

11. U.S. DEPARTMENT OF TRANSPORTATION DESCRIPTION (including proper shipping name, hazard class, UN ID number, and any additional information)	12. DOT LABEL "RADIOACTIVE"	13. TRANSPORT INDEX	14. PHYSICAL AND CHEMICAL FORM	15. INDIVIDUAL RADIONUCLIDES	16. TOTAL PACKAGE ACTIVITY MBq	mCi	17. LSA/SCO CLASS	18. TOTAL WEIGHT OR VOLUME (Use appropriate units)	19. IDENTIFICATION NUMBER OF PACKAGE
Non-Radioactive per DOT 1 - 5 GAL POLY DRUM	NA	NA	SOLID/METAL OXIDES	H-3	3.7000000000	(0.1000000000)	NA	0.66 ft³ 6.00000 lb	11-000223 (DRUM-1)

FOR CONSIGNEE USE ONLY

Tennessee "License For Delivery" No. ______

South Carolina Transport Permit No. ______

US Ecology Generator No. ______

US Ecology Permit No. ______

20. Generator Certification Statement

a) Radioactive Materials. Certification is hereby made that this shipment of low-level radioactive waste has been prepared in accordance with a radioactive waste management program which has been approved by the Nuclear Regulatory Commission or an Agreement State regulatory agency and with the current revision of the site Waste Acceptance Criteria.
b) [illegible]
c) [illegible]
d) [illegible]

Thomas A. Schumacher — [signature] — 2/4/11
Print Name — Signature — Date

Form 540 (10-95)

Modified Date: 01/28/2011 09:57

Received 2/4/11
B Harwell

RADIOACTIVE WASTE DISPOSAL LOG
SANITARY SYSTEM

Date	Isotope	µCi	Volume (Wash)	Lab	Signature
6.26.91	^{3}H	18	1200 ml	208	S. Gal
7-17-91	^{3}H	40µCi	1800 ml	208	D Pardue
7-24-91	^{3}H	25µCi	2,000 ml	208	D. Pardue
8-7-91	^{3}H	25µCi	2,000 ml	208	D Pardue
8-8-91	^{3}H	25µCi	2,000 ml	208	D Pardue
8-21-91	^{3}H	25µCi	2,000 ml	208	D Pardue
10-9-91	^{3}H	30µCi	2,000 ml	208	D Pardue
12-18-91	^{3}H	80µCi	3,000 ml	208	D Pardue
1-15-91	^{3}H	50µCi	3,500 ml	208	D Pardue
2-5-91	^{3}H	90µCi	3,500 ml	208	D Pardue
2.5.92	^{32}P	1uCi	1,250 ml	208	A. Colvin
2.7.92	^{32}P	1uCi	1,250 ml	208	"
2.10.92	^{32}P	2uCi	2,500 ml	208	"
2.11.92	^{32}P	3uCi	1,000 ml	208	"
2.14.92	^{32}P	1uCi	~~3,000 ml~~ 4,000 ml	208	"
2.20.92	^{32}P	1uCi	2,500 ml	208	"
2.25.92	^{32}P	1uCi	1,500 ml	208	"
3.11.92	^{32}P	1uCi	1,000 ml	208	"
3-18-92	^{3}H	35µCi	2,000 ml	208	D Pardue
4-2-92	^{35}S	0.0uCi	20,000 mL	208	M. Dasovich
→ took a reading and it was 0					

Appendix R7
Radioactive Waste Log
(continued)

Sanitary Sewer System Radioisotope Waste Log
(Only Water Miscible Liquids)

Date	Isotope	Activity/ml	Inv ID #	Your Name
4-8-92	^3H	60µCi / 2000ml	332	D. Pardue
4.10.92	^{32}P	10uCi / 5000ml	mixture	K. Colvin
4.15.92	^{32}P	3uCi / 4.5 liters	"	K. Colvin
5.01.92	"	4uCi / 5 liters	"	K. Colvin
5.05.92	"	2uCi / 2500 ml	"	K. Colvin
5.06.92	"	2uCi / 2500 ml	367	K. Colvin
5-6-92	^3H	60µCi / 2000ml	332	D. Pardue
5.08.92	^{32}P	2uCi / 2500 ml	367	K. Colvin
5.11.92	^{32}P	2uCi / 2500 ml	~~[illegible]~~ 369	K. Colvin
5.15.92	^{32}P	2uCi / 2500 ml	369	K. Colvin
5.18.92	^{32}P	2uCi / 2500 ml	370	K. Colvin
5.20.92	^{32}P	1uCi / 1000 ml	375	"
5.20.92	^3H	40µCi / 2000ml	371	D.Pardue / Hellman
5.29.92	^3H	40 µci / 2000 ml	371	S. Calvin
6-3-92	^3H	60µCi / 2,500ml	371	D. Pardue
7-14-92	^3H	59µCi / 3,000ml	372	D Pardue
7.22.92	^3H	70 µci / 3000 ml	372	S. Calvin
6-10-92		35 µci / 2000 ml	371	S. Calvin
7-29-92	^3H	40µCi / 2,000ml	372	S.Calvin / D.Pardue
8-4-92	^3H	25µCi / 2,000 ml	372	D.Pardue
8.14.92	(^3H)	20µci / 2000ml	405	S. Calvin
8.19.92	(^3H)	25 µci / 2000 ml	405	S. ~~Cal~~ Calvin
9/1/92	(^{125}I)	[illegible],699 µci / 19 Liters		Fern [illegible]
9-9-92	(^3H)	40 µci / 3 l	405	S. Calvin
9.16.92	(^3H)	30 µci / 3 l	423	S. Calvin
9.23.92	(^3H)	30 µci / 3 l	423	S. Calvin
9-30-92	^3H	40µCi / 2,000ml	40~~5~~2 DP	D. Pardue

DandD Building Occupancy Scenario

DandD Version: 2.1.0
Run Date/Time: 10/7/2011 10:27:15 AM
Site Name: Any
Description: Area Correction Factor for C14 and 1 square meter.
FileName:C:\Documents and Settings\Tony McGill\My Documents\DD\c14_1.mcd

Options:

Implicit progeny doses NOT included with explicit parent doses
Nuclide concentrations are distributed among all progeny
Number of simulations: 100
Seed for Random Generation: 8718721
Averages used for behavioral type parameters

External Pathway is ON
Inhalation Pathway is ON
Secondary Ingestion Pathway is ON

Initial Activities:

Nuclide	Area of Contamination (m^2)	Distribution
14C	1	CONSTANT(dpm/100 cm**2)
Justification for concentration: Area Factor Calculation		Value 1.00E+00

Chain Data:

Number of chains: **1**

Chain No. 1: **14C**
Nuclides in chain: **1**

Nuclide	Chain Position	Half Life	First Parent	Fractional Yield	Second Parent	Fractional Yield	Ingestion CEDE Factor (Sv/Bq)	Inhalation CEDE Factor (Sv/Bq)	Surface Dose Rate Factor ((Sv/d) /(Bq/m^2))	15 cm Dose Rate Factor ((Sv/d) /(Bq/m^3))
14C	1	2.09E+06					5.64E-10	5.64E-10	1.39E-15	6.22E-18

Initial Concentrations:

Note: All reported values are the upper bound of the symmetric 95% confidence interval for the 0.9 quantile value

Nuclide	Surface Concentration (dpm/100 cm**2)
14C	1.00E-01

Model Parameters:

General Parameters:

Parameter Name	Description	Distribution
To:Time In Building	The time in the building during the occupancy period	CONSTANT(hr/week)
Default value used		Value 4.50E+01
Tto:Occupancy Period	The duration of the occupancy exposure period	CONSTANT(days)
Default value used		Value 3.65E+02
Vo:Breathing Rate	The average volumetric breathing rate during building occupancy for an 8-hour work day	CONSTANT(m**3/hr)
Default value used		Value 1.40E+00
RFo*:Resuspension Factor	Effective resuspension factor during the occupancy period = RFo * Fl	DERIVED(1/m)
Default value used		
GO*:Ingestion Rate	Effective secondary ingestion transfer rate of removable surface activity from building surfaces to the mouth during building occupancy = GO * Fl	DERIVED(m**2/hr)
Default value used		
Tstart:Start Time	The start time of the scenario in days	CONSTANT(days)
Default value used		Value 0.00E+00
Tend:End Time	The ending time of the scenario in days	CONSTANT(days)
Default value used		Value 3.65E+02
dt:Time Step Size	The time step size	CONSTANT(days)
Default value used		Value 3.65E+02
Pstep:Print Step Size	The time steps for the history file. Doses will be written to the history file every n time steps	CONSTANT(none)
Default value used		Value 1.00E+00
AOExt:External Exposure Area	Minimum surface area to which occupant is exposed via external radiation during occupancy period	CONSTANT(m**2)
Default value used		Value 1.00E+01
AOInh:Inhalation Exposure Area	Minimum surface area to which occupant is exposed via inhalation during occupancy period	CONSTANT(m**2)
Default value used		Value 1.00E+01

AOIng:Secondary Ingestion Exposure Area	Minimum surface area to which occupant is exposed via secondary ingestion during occupancy period	CONSTANT(m**2)
Default value used		Value 1.00E+01
AO:Exposure Area	Minimum surface area to which occupant is exposed during the occupancy period	DERIVED(m**2)
Default value used		
Fl:Loose Fraction	Fraction of surface contamination available for resuspension and ingestion	CONSTANT(none)
Default value used		Value 1.00E-01
Rfo:Loose Resuspension Factor	Resuspension factor for loose contamination	CONTINUOUS LOGARITHMIC(1/m)
Default value used		Value / Probability 9.12E-06 / 0.00E+00 1.10E-04 / 7.67E-01 1.46E-04 / 9.09E-01 1.62E-04 / 9.50E-01 1.85E-04 / 9.90E-01 1.90E-04 / 1.00E+00
GO:Loose Ingestion Rate	The secondary ingestion transfer rate of loose removable surface activity from building surfaces to the mouth during building occupancy	CONSTANT(m**2/hr)
Default value used		Value 1.10E-04

Correlation Coefficients:

None

Summary Results:

90.00% **of the** 100 **calculated TEDE values are <** 6.80E-07 **mrem/year .**
The 95 % Confidence Interval for the 0.9 **quantile value of TEDE is** 6.33E-07 **to** 7.41E-07 **mrem/year**

Detailed Results:

Note: All reported values are the upper bound of the symmetric 95% confidence interval for the 0.9 **quantile value**

Concentration at Time of Peak Dose:

Nuclide	Surface Concentration (dpm/100 cm**2)
14C	1.00E-01

Pathway Dose from All Nuclides (mrem)

All Pathways Dose	External	Inhalation	Secondary Ingestion

7.41E-07	2.26E-09	4.96E-07	2.42E-07

Radionuclide Dose through All Active Pathways (mrem)

Nuclide	All Pathways Dose
14C	7.41E-07
All Nuclides	7.41E-07

Dose from Each Nuclide through Each Active Pathway (mrem)

Nuclide	External	Inhalation	Secondary Ingestion
14C	2.26E-09	4.96E-07	2.42E-07

DandD Building Occupancy Scenario

DandD Version: 2.1.0
Run Date/Time: 10/7/2011 10:31:38 AM
Site Name: Any
Description: Area Correction Factor for C14 and 10 square meters.
FileName:C:\Documents and Settings\Tony McGill\My Documents\DD\c14_10.mcd

Options:

Implicit progeny doses NOT included with explicit parent doses
Nuclide concentrations are distributed among all progeny
Number of simulations: 100
Seed for Random Generation: 8718721
Averages used for behavioral type parameters

External Pathway is ON
Inhalation Pathway is ON
Secondary Ingestion Pathway is ON

Initial Activities:

Nuclide	Area of Contamination (m^2)	Distribution
14C	10	CONSTANT(dpm/100 cm**2)
Justification for concentration: Area Factor Calculation		Value 1.00E+00

Chain Data:

Number of chains: **1**

Chain No. 1: **14C**
Nuclides in chain: **1**

Nuclide	Chain Position	Half Life	First Parent	Fractional Yield	Second Parent	Fractional Yield	Ingestion CEDE Factor (Sv/Bq)	Inhalation CEDE Factor (Sv/Bq)	Surface Dose Rate Factor ((Sv/d) /(Bq/m^2))	15 cm Dose Rate Factor ((Sv/d) /(Bq/m^3))
14C	1	2.09E+06					5.64E-10	5.64E-10	1.39E-15	6.22E-18

Initial Concentrations:

Note: All reported values are the upper bound of the symmetric 95% confidence interval for the 0.9 quantile value

Nuclide	Surface Concentration (dpm/100 cm**2)
14C	1.00E+00

Model Parameters:

General Parameters:

Parameter Name	Description	Distribution
To:Time In Building	The time in the building during the occupancy period	CONSTANT(hr/week)
Default value used		Value 4.50E+01
Tto:Occupancy Period	The duration of the occupancy exposure period	CONSTANT(days)
Default value used		Value 3.65E+02
Vo:Breathing Rate	The average volumetric breathing rate during building occupancy for an 8-hour work day	CONSTANT(m**3/hr)
Default value used		Value 1.40E+00
RFo*:Resuspension Factor	Effective resuspension factor during the occupancy period = RFo * Fl	DERIVED(1/m)
Default value used		
GO*:Ingestion Rate	Effective secondary ingestion transfer rate of removable surface activity from building surfaces to the mouth during building occupancy = GO * Fl	DERIVED(m**2/hr)
Default value used		
Tstart:Start Time	The start time of the scenario in days	CONSTANT(days)
Default value used		Value 0.00E+00
Tend:End Time	The ending time of the scenario in days	CONSTANT(days)
Default value used		Value 3.65E+02
dt:Time Step Size	The time step size	CONSTANT(days)
Default value used		Value 3.65E+02
Pstep:Print Step Size	The time steps for the history file. Doses will be written to the history file every n time steps	CONSTANT(none)
Default value used		Value 1.00E+00
AOExt:External Exposure Area	Minimum surface area to which occupant is exposed via external radiation during occupancy period	CONSTANT(m**2)
Default value used		Value 1.00E+01
AOInh:Inhalation Exposure Area	Minimum surface area to which occupant is exposed via inhalation during occupancy period	CONSTANT(m**2)
Default value used		Value 1.00E+01

AOIng:Secondary Ingestion Exposure Area	Minimum surface area to which occupant is exposed via secondary ingestion during occupancy period	CONSTANT(m**2)
Default value used		Value 1.00E+01
AO:Exposure Area	Minimum surface area to which occupant is exposed during the occupancy period	DERIVED(m**2)
Default value used		
Fl:Loose Fraction	Fraction of surface contamination available for resuspension and ingestion	CONSTANT(none)
Default value used		Value 1.00E-01
Rfo:Loose Resuspension Factor	Resuspension factor for loose contamination	CONTINUOUS LOGARITHMIC(1/m)
Default value used		Value / Probability 9.12E-06 / 0.00E+00 1.10E-04 / 7.67E-01 1.46E-04 / 9.09E-01 1.62E-04 / 9.50E-01 1.85E-04 / 9.90E-01 1.90E-04 / 1.00E+00
GO:Loose Ingestion Rate	The secondary ingestion transfer rate of loose removable surface activity from building surfaces to the mouth during building occupancy	CONSTANT(m**2/hr)
Default value used		Value 1.10E-04

Correlation Coefficients:

None

Summary Results:

90.00% of the 100 calculated TEDE values are < 6.80E-06 mrem/year .
The 95 % Confidence Interval for the 0.9 quantile value of TEDE is 6.33E-06 to 7.41E-06 mrem/year

Detailed Results:

Note: All reported values are the upper bound of the symmetric 95% confidence interval for the 0.9 quantile value

Concentration at Time of Peak Dose:

Nuclide	Surface Concentration (dpm/100 cm**2)
14C	1.00E+00

Pathway Dose from All Nuclides (mrem)

All Pathways Dose	External	Inhalation	Secondary Ingestion

7.41E-06	2.26E-08	4.96E-06	2.42E-06

Radionuclide Dose through All Active Pathways (mrem)

Nuclide	All Pathways Dose
14C	7.41E-06
All Nuclides	7.41E-06

Dose from Each Nuclide through Each Active Pathway (mrem)

Nuclide	External	Inhalation	Secondary Ingestion
14C	2.26E-08	4.96E-06	2.42E-06

DandD Building Occupancy Scenario

DandD Version: 2.1.0
Run Date/Time: 10/7/2011 9:51:49 AM
Site Name: any
Description: Area Correction Factor for H3 and 0.01 square meters.
FileName:C:\Documents and Settings\Tony McGill\My Documents\DD\h3_0.01.mcd

Options:

Implicit progeny doses NOT included with explicit parent doses
Nuclide concentrations are distributed among all progeny
Number of simulations: 100
Seed for Random Generation: 8718721
Averages used for behavioral type parameters

External Pathway is ON
Inhalation Pathway is ON
Secondary Ingestion Pathway is ON

Initial Activities:

Nuclide	Area of Contamination (m^2)	Distribution
3H	0.01	CONSTANT(dpm/100 cm**2)
Justification for concentration: Area Factor Calculation		Value 1.00E+00

Chain Data:

Number of chains: **1**

Chain No. 1: **3H**
Nuclides in chain: **1**

Nuclide	Chain Position	Half Life	First Parent	Fractional Yield	Second Parent	Fractional Yield	Ingestion CEDE Factor (Sv/Bq)	Inhalation CEDE Factor (Sv/Bq)	Surface Dose Rate Factor ((Sv/d)/(Bq/m^2))	15 cm Dose Rate Factor ((Sv/d)/(Bq/m^3))
3H	1	4.51E+03					1.73E-11	1.73E-11	0.00E+00	0.00E+00

Initial Concentrations:

Note: All reported values are the upper bound of the symmetric 95% confidence interval for the 0.9 quantile value

Nuclide	Surface Concentration (dpm/100 cm**2)
3H	1.00E-03

Model Parameters:

General Parameters:

Parameter Name	Description	Distribution
To:Time In Building	The time in the building during the occupancy period	CONSTANT(hr/week)
Default value used		Value 4.50E+01
Tto:Occupancy Period	The duration of the occupancy exposure period	CONSTANT(days)
Default value used		Value 3.65E+02
Vo:Breathing Rate	The average volumetric breathing rate during building occupancy for an 8-hour work day	CONSTANT(m**3/hr)
Default value used		Value 1.40E+00
RFo*:Resuspension Factor	Effective resuspension factor during the occupancy period = RFo * Fl	DERIVED(1/m)
Default value used		
GO*:Ingestion Rate	Effective secondary ingestion transfer rate of removable surface activity from building surfaces to the mouth during building occupancy = GO * Fl	DERIVED(m**2/hr)
Default value used		
Tstart:Start Time	The start time of the scenario in days	CONSTANT(days)
Default value used		Value 0.00E+00
Tend:End Time	The ending time of the scenario in days	CONSTANT(days)
Default value used		Value 3.65E+02
dt:Time Step Size	The time step size	CONSTANT(days)
Default value used		Value 3.65E+02
Pstep:Print Step Size	The time steps for the history file. Doses will be written to the history file every n time steps	CONSTANT(none)
Default value used		Value 1.00E+00
AOExt:External Exposure Area	Minimum surface area to which occupant is exposed via external radiation during occupancy period	CONSTANT(m**2)
Default value used		Value 1.00E+01
AOInh:Inhalation Exposure Area	Minimum surface area to which occupant is exposed via inhalation during occupancy period	CONSTANT(m**2)
Default value used		Value 1.00E+01

AOIng:Secondary Ingestion Exposure Area	Minimum surface area to which occupant is exposed via secondary ingestion during occupancy period	CONSTANT(m**2)
Default value used		Value 1.00E+01
AO:Exposure Area	Minimum surface area to which occupant is exposed during the occupancy period	DERIVED(m**2)
Default value used		
Fl:Loose Fraction	Fraction of surface contamination available for resuspension and ingestion	CONSTANT(none)
Default value used		Value 1.00E-01
Rfo:Loose Resuspension Factor	Resuspension factor for loose contamination	CONTINUOUS LOGARITHMIC(1/m)
Default value used		Value / Probability: 9.12E-06 / 0.00E+00; 1.10E-04 / 7.67E-01; 1.46E-04 / 9.09E-01; 1.62E-04 / 9.50E-01; 1.85E-04 / 9.90E-01; 1.90E-04 / 1.00E+00
GO:Loose Ingestion Rate	The secondary ingestion transfer rate of loose removable surface activity from building surfaces to the mouth during building occupancy	CONSTANT(m**2/hr)
Default value used		Value 1.10E-04

Correlation Coefficients:

None

Summary Results:

90.00% **of the** 100 **calculated TEDE values are <** 2.02E-10 **mrem/year .**
The 95 % Confidence Interval for the 0.9 **quantile value of TEDE is** 1.88E-10 **to** 2.20E-10 **mrem/year**

Detailed Results:

Note: All reported values are the upper bound of the symmetric 95% confidence interval for the 0.9 quantile value

Concentration at Time of Peak Dose:

Nuclide	Surface Concentration (dpm/100 cm**2)
3H	9.72E-04

Pathway Dose from All Nuclides (mrem)

All Pathways Dose	External	Inhalation	Secondary Ingestion

2.20E-10	0.00E+00	1.48E-10	7.22E-11

Radionuclide Dose through All Active Pathways (mrem)

Nuclide	All Pathways Dose
3H	2.20E-10
All Nuclides	2.20E-10

Dose from Each Nuclide through Each Active Pathway (mrem)

Nuclide	External	Inhalation	Secondary Ingestion
3H	0.00E+00	1.48E-10	7.22E-11

DandD Building Occupancy Scenario

DandD Version: 2.1.0
Run Date/Time: 10/7/2011 9:48:21 AM
Site Name: any
Description: Area Correction Factor for H3 and 0.1 square meters.
FileName:C:\Documents and Settings\Tony McGill\My Documents\DD\h3_0.1.mcd

Options:

Implicit progeny doses NOT included with explicit parent doses
Nuclide concentrations are distributed among all progeny
Number of simulations: 100
Seed for Random Generation: 8718721
Averages used for behavioral type parameters

External Pathway is ON
Inhalation Pathway is ON
Secondary Ingestion Pathway is ON

Initial Activities:

Nuclide	Area of Contamination (m^2)	Distribution
3H	0.1	CONSTANT(dpm/100 cm**2)
Justification for concentration: Area Factor Calculation		Value 1.00E+00

Chain Data:

Number of chains: **1**

Chain No. 1: **3H**
Nuclides in chain: **1**

Nuclide	Chain Position	Half Life	First Parent	Fractional Yield	Second Parent	Fractional Yield	Ingestion CEDE Factor (Sv/Bq)	Inhalation CEDE Factor (Sv/Bq)	Surface Dose Rate Factor ((Sv/d)/(Bq/m^2))	15 cm Dose Rate Factor ((Sv/d)/(Bq/m^3))
3H	1	4.51E+03					1.73E-11	1.73E-11	0.00E+00	0.00E+00

Initial Concentrations:

Note: All reported values are the upper bound of the symmetric 95% confidence interval for the 0.9 quantile value

Nuclide	Surface Concentration (dpm/100 cm**2)
3H	1.00E-02

Model Parameters:

General Parameters:

Parameter Name	Description	Distribution
To:Time In Building	The time in the building during the occupancy period	CONSTANT(hr/week)
Default value used		Value 4.50E+01
Tto:Occupancy Period	The duration of the occupancy exposure period	CONSTANT(days)
Default value used		Value 3.65E+02
Vo:Breathing Rate	The average volumetric breathing rate during building occupancy for an 8-hour work day	CONSTANT(m**3/hr)
Default value used		Value 1.40E+00
RFo*:Resuspension Factor	Effective resuspension factor during the occupancy period = RFo * Fl	DERIVED(1/m)
Default value used		
GO*:Ingestion Rate	Effective secondary ingestion transfer rate of removable surface activity from building surfaces to the mouth during building occupancy = GO * Fl	DERIVED(m**2/hr)
Default value used		
Tstart:Start Time	The start time of the scenario in days	CONSTANT(days)
Default value used		Value 0.00E+00
Tend:End Time	The ending time of the scenario in days	CONSTANT(days)
Default value used		Value 3.65E+02
dt:Time Step Size	The time step size	CONSTANT(days)
Default value used		Value 3.65E+02
Pstep:Print Step Size	The time steps for the history file. Doses will be written to the history file every n time steps	CONSTANT(none)
Default value used		Value 1.00E+00
AOExt:External Exposure Area	Minimum surface area to which occupant is exposed via external radiation during occupancy period	CONSTANT(m**2)
Default value used		Value 1.00E+01
AOInh:Inhalation Exposure Area	Minimum surface area to which occupant is exposed via inhalation during occupancy period	CONSTANT(m**2)
Default value used		Value 1.00E+01

AOIng:Secondary Ingestion Exposure Area	Minimum surface area to which occupant is exposed via secondary ingestion during occupancy period	CONSTANT(m**2)
Default value used		Value 1.00E+01
AO:Exposure Area	Minimum surface area to which occupant is exposed during the occupancy period	DERIVED(m**2)
Default value used		
Fl:Loose Fraction	Fraction of surface contamination available for resuspension and ingestion	CONSTANT(none)
Default value used		Value 1.00E-01
Rfo:Loose Resuspension Factor	Resuspension factor for loose contamination	CONTINUOUS LOGARITHMIC(1/m)
Default value used		Value / Probability: 9.12E-06 / 0.00E+00; 1.10E-04 / 7.67E-01; 1.46E-04 / 9.09E-01; 1.62E-04 / 9.50E-01; 1.85E-04 / 9.90E-01; 1.90E-04 / 1.00E+00
GO:Loose Ingestion Rate	The secondary ingestion transfer rate of loose removable surface activity from building surfaces to the mouth during building occupancy	CONSTANT(m**2/hr)
Default value used		Value 1.10E-04

Correlation Coefficients:

None

Summary Results:

90.00% of the 100 calculated TEDE values are < 2.02E-09 mrem/year .
The 95 % Confidence Interval for the 0.9 quantile value of TEDE is 1.88E-09 to 2.20E-09 mrem/year

Detailed Results:

Note: All reported values are the upper bound of the symmetric 95% confidence interval for the 0.9 quantile value

Concentration at Time of Peak Dose:

Nuclide	Surface Concentration (dpm/100 cm**2)
3H	9.72E-03

Pathway Dose from All Nuclides (mrem)

All Pathways Dose	External	Inhalation	Secondary Ingestion

2.20E-09	0.00E+00	1.48E-09	7.22E-10

Radionuclide Dose through All Active Pathways (mrem)

Nuclide	All Pathways Dose
3H	2.20E-09
All Nuclides	2.20E-09

Dose from Each Nuclide through Each Active Pathway (mrem)

Nuclide	External	Inhalation	Secondary Ingestion
3H	0.00E+00	1.48E-09	7.22E-10

DandD Building Occupancy Scenario

DandD Version: 2.1.0
Run Date/Time: 10/7/2011 9:46:12 AM
Site Name: any
Description: Area Correction Factor for H3 and 1 square meter.
FileName:C:\Documents and Settings\Tony McGill\My Documents\DD\h3_1.mcd

Options:

Implicit progeny doses NOT included with explicit parent doses
Nuclide concentrations are distributed among all progeny
Number of simulations: 100
Seed for Random Generation: 8718721
Averages used for behavioral type parameters

External Pathway is ON
Inhalation Pathway is ON
Secondary Ingestion Pathway is ON

Initial Activities:

Nuclide	Area of Contamination (m^2)	Distribution
3H	1	CONSTANT(dpm/100 cm**2)
Justification for concentration: Area Factor Calculation		Value 1.00E+00

Chain Data:

Number of chains: **1**

Chain No. 1: **3H**
Nuclides in chain: **1**

Nuclide	Chain Position	Half Life	First Parent	Fractional Yield	Second Parent	Fractional Yield	Ingestion CEDE Factor (Sv/Bq)	Inhalation CEDE Factor (Sv/Bq)	Surface Dose Rate Factor ((Sv/d)/(Bq/m^2))	15 cm Dose Rate Factor ((Sv/d)/(Bq/m^3))
3H	1	4.51E+03					1.73E-11	1.73E-11	0.00E+00	0.00E+00

Initial Concentrations:

Note: All reported values are the upper bound of the symmetric 95% confidence interval for the 0.9 quantile value

Nuclide	Surface Concentration (dpm/100 cm**2)
3H	1.00E-01

Model Parameters:

General Parameters:

Parameter Name	Description	Distribution
To:Time In Building	The time in the building during the occupancy period	CONSTANT(hr/week)
Default value used		Value 4.50E+01
Tto:Occupancy Period	The duration of the occupancy exposure period	CONSTANT(days)
Default value used		Value 3.65E+02
Vo:Breathing Rate	The average volumetric breathing rate during building occupancy for an 8-hour work day	CONSTANT(m**3/hr)
Default value used		Value 1.40E+00
RFo*:Resuspension Factor	Effective resuspension factor during the occupancy period = RFo * Fl	DERIVED(1/m)
Default value used		
GO*:Ingestion Rate	Effective secondary ingestion transfer rate of removable surface activity from building surfaces to the mouth during building occupancy = GO * Fl	DERIVED(m**2/hr)
Default value used		
Tstart:Start Time	The start time of the scenario in days	CONSTANT(days)
Default value used		Value 0.00E+00
Tend:End Time	The ending time of the scenario in days	CONSTANT(days)
Default value used		Value 3.65E+02
dt:Time Step Size	The time step size	CONSTANT(days)
Default value used		Value 3.65E+02
Pstep:Print Step Size	The time steps for the history file. Doses will be written to the history file every n time steps	CONSTANT(none)
Default value used		Value 1.00E+00
AOExt:External Exposure Area	Minimum surface area to which occupant is exposed via external radiation during occupancy period	CONSTANT(m**2)
Default value used		Value 1.00E+01
AOInh:Inhalation Exposure Area	Minimum surface area to which occupant is exposed via inhalation during occupancy period	CONSTANT(m**2)
Default value used		Value 1.00E+01

AOIng:Secondary Ingestion Exposure Area	Minimum surface area to which occupant is exposed via secondary ingestion during occupancy period	CONSTANT(m**2)
Default value used		Value 1.00E+01
AO:Exposure Area	Minimum surface area to which occupant is exposed during the occupancy period	DERIVED(m**2)
Default value used		
Fl:Loose Fraction	Fraction of surface contamination available for resuspension and ingestion	CONSTANT(none)
Default value used		Value 1.00E-01
Rfo:Loose Resuspension Factor	Resuspension factor for loose contamination	CONTINUOUS LOGARITHMIC(1/m)
Default value used		Value / Probability: 9.12E-06 / 0.00E+00; 1.10E-04 / 7.67E-01; 1.46E-04 / 9.09E-01; 1.62E-04 / 9.50E-01; 1.85E-04 / 9.90E-01; 1.90E-04 / 1.00E+00
GO:Loose Ingestion Rate	The secondary ingestion transfer rate of loose removable surface activity from building surfaces to the mouth during building occupancy	CONSTANT(m**2/hr)
Default value used		Value 1.10E-04

Correlation Coefficients:

None

Summary Results:

90.00% **of the** 100 **calculated TEDE values are <** 2.02E-08 **mrem/year .**
The 95 % Confidence Interval for the 0.9 **quantile value of TEDE is** 1.88E-08 **to** 2.20E-08 **mrem/year**

Detailed Results:

Note: All reported values are the upper bound of the symmetric 95% confidence interval for the 0.9 **quantile value**

Concentration at Time of Peak Dose:

Nuclide	Surface Concentration (dpm/100 cm**2)
3H	9.72E-02

Pathway Dose from All Nuclides (mrem)

All Pathways Dose	External	Inhalation	Secondary Ingestion

2.20E-08	0.00E+00	1.48E-08	7.22E-09

Radionuclide Dose through All Active Pathways (mrem)

Nuclide	All Pathways Dose
3H	2.20E-08
All Nuclides	2.20E-08

Dose from Each Nuclide through Each Active Pathway (mrem)

Nuclide	External	Inhalation	Secondary Ingestion
3H	0.00E+00	1.48E-08	7.22E-09

DandD Building Occupancy Scenario

DandD Version: 2.1.0
Run Date/Time: 10/7/2011 9:44:07 AM
Site Name: any
Description: Area Correction Factor for H3 and 10 square meters.
FileName:C:\Documents and Settings\Tony McGill\My Documents\DD\h3_10.mcd

Options:

Implicit progeny doses NOT included with explicit parent doses
Nuclide concentrations are distributed among all progeny
Number of simulations: 100
Seed for Random Generation: 8718721
Averages used for behavioral type parameters

External Pathway is ON
Inhalation Pathway is ON
Secondary Ingestion Pathway is ON

Initial Activities:

Nuclide	Area of Contamination (m^2)	Distribution
3H	10	CONSTANT(dpm/100 cm**2)
Justification for concentration: Area Factor Calculation		Value 1.00E+00

Chain Data:

Number of chains: **1**

Chain No. 1: **3H**
Nuclides in chain: **1**

Nuclide	Chain Position	Half Life	First Parent	Fractional Yield	Second Parent	Fractional Yield	Ingestion CEDE Factor (Sv/Bq)	Inhalation CEDE Factor (Sv/Bq)	Surface Dose Rate Factor ((Sv/d) /(Bq/m^2))	15 cm Dose Rate Factor ((Sv/d) /(Bq/m^3))
3H	1	4.51E+03					1.73E-11	1.73E-11	0.00E+00	0.00E+00

Initial Concentrations:

Note: All reported values are the upper bound of the symmetric 95% confidence interval for the 0.9 quantile value

Nuclide	Surface Concentration (dpm/100 cm**2)
3H	1.00E+00

Model Parameters:

General Parameters:

Parameter Name	Description	Distribution
To:Time In Building	The time in the building during the occupancy period	CONSTANT(hr/week)
Default value used		Value 4.50E+01
Tto:Occupancy Period	The duration of the occupancy exposure period	CONSTANT(days)
Default value used		Value 3.65E+02
Vo:Breathing Rate	The average volumetric breathing rate during building occupancy for an 8-hour work day	CONSTANT(m**3/hr)
Default value used		Value 1.40E+00
RFo*:Resuspension Factor	Effective resuspension factor during the occupancy period = RFo * Fl	DERIVED(1/m)
Default value used		
GO*:Ingestion Rate	Effective secondary ingestion transfer rate of removable surface activity from building surfaces to the mouth during building occupancy = GO * Fl	DERIVED(m**2/hr)
Default value used		
Tstart:Start Time	The start time of the scenario in days	CONSTANT(days)
Default value used		Value 0.00E+00
Tend:End Time	The ending time of the scenario in days	CONSTANT(days)
Default value used		Value 3.65E+02
dt:Time Step Size	The time step size	CONSTANT(days)
Default value used		Value 3.65E+02
Pstep:Print Step Size	The time steps for the history file. Doses will be written to the history file every n time steps	CONSTANT(none)
Default value used		Value 1.00E+00
AOExt:External Exposure Area	Minimum surface area to which occupant is exposed via external radiation during occupancy period	CONSTANT(m**2)
Default value used		Value 1.00E+01
AOInh:Inhalation Exposure Area	Minimum surface area to which occupant is exposed via inhalation during occupancy period	CONSTANT(m**2)
Default value used		Value 1.00E+01

AOIng:Secondary Ingestion Exposure Area	Minimum surface area to which occupant is exposed via secondary ingestion during occupancy period	CONSTANT(m**2)
Default value used		Value 1.00E+01
AO:Exposure Area	Minimum surface area to which occupant is exposed during the occupancy period	DERIVED(m**2)
Default value used		
Fl:Loose Fraction	Fraction of surface contamination available for resuspension and ingestion	CONSTANT(none)
Default value used		Value 1.00E-01
Rfo:Loose Resuspension Factor	Resuspension factor for loose contamination	CONTINUOUS LOGARITHMIC(1/m)
Default value used		Value / Probability 9.12E-06 / 0.00E+00 1.10E-04 / 7.67E-01 1.46E-04 / 9.09E-01 1.62E-04 / 9.50E-01 1.85E-04 / 9.90E-01 1.90E-04 / 1.00E+00
GO:Loose Ingestion Rate	The secondary ingestion transfer rate of loose removable surface activity from building surfaces to the mouth during building occupancy	CONSTANT(m**2/hr)
Default value used		Value 1.10E-04

Correlation Coefficients:

None

Summary Results:

90.00% **of the** 100 **calculated TEDE values are <** 2.02E-07 **mrem/year .**
The 95 % Confidence Interval for the 0.9 **quantile value of TEDE is** 1.88E-07 **to** 2.20E-07 **mrem/year**

Detailed Results:

Note: All reported values are the upper bound of the symmetric 95% confidence interval for the 0.9 **quantile value**

Concentration at Time of Peak Dose:

Nuclide	Surface Concentration (dpm/100 cm**2)
3H	9.72E-01

Pathway Dose from All Nuclides (mrem)

All Pathways Dose	External	Inhalation	Secondary Ingestion

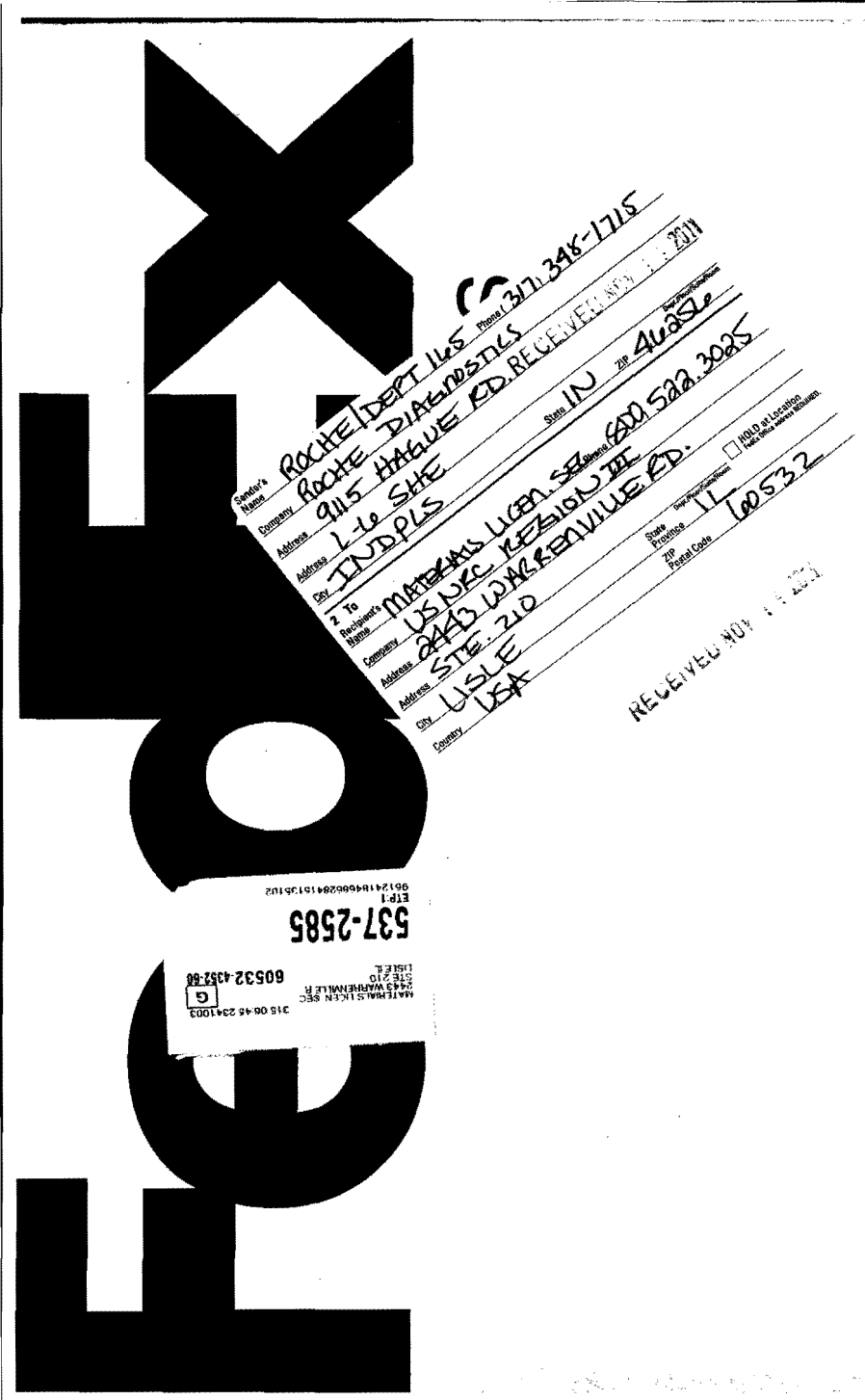
2.20E-07	0.00E+00	1.48E-07	7.22E-08

Radionuclide Dose through All Active Pathways (mrem)

Nuclide	All Pathways Dose
3H	2.20E-07
All Nuclides	2.20E-07

Dose from Each Nuclide through Each Active Pathway (mrem)

Nuclide	External	Inhalation	Secondary Ingestion
3H	0.00E+00	1.48E-07	7.22E-08



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