United States Department of the Interior
U. S. GEOLOGICAL SURVEY
Columbia Environmental Research Center
4200 New Haven Road
Columbia, Missouri 65201

Monday, April 2, 2012

Re: License No.: 24-12728-01
Docket No. 030-05146

Aaron McCraw
U.S. Nuclear Regulatory Commission – Region III
2443 Warrenville Rd., Suite 210
Lisle, IL 60532-4352

Dear Mr. McCraw:

The purpose of this letter is to request an expedited review to obtain an amendment to the USGS Columbia Environmental Research Center (CERC) NRC License to release the following two buildings for unrestricted use: Building 3 on the Center's 1995 License renewal (also known as the Analytical Building), and Building 5 on the Center's 1995 License renewal (also known as the Biology East Building).

In summary, these buildings are vacated and there has been no radioactive materials used in these buildings in the last 20-25 years. In Building 3, 1.5 mCi of non-volatile Chromium-51 Chloride was used from January 1, 1980 to December 30, 1980; and gas chromatographs with Nickel-63 ECD detectors were in the building from January 4, 1984 to July 1, 1986. In total for Building 5, an amount of 0.76 mCi of non-volatile Strontium-85 Chloride was used from January 1, 1982 to December 31, 1983, and 0.4 mCi of non-volatile Carbon-14 labeled Sodium Bicarbonate was used from October 1, 1991 to February 7, 1992. Building 5 was removed from our license in May 1995. Monthly surface wipes of these buildings during the period of radioactive material use never detected any radiation above background. No radioactive materials have been used in the Analytical Building since July 1986, and none used in Biology East Building since March 1992. Please refer to the supporting documents for more detailed information.

The reason we request an expedited review is because the US Government is under an extremely tight deadline and has a contract to demolish these buildings in a few weeks. These buildings are adjacent to a newly constructed 22,000 square foot research facility funded by American Recovery and Reinvestment Act (ARRA). The US Government is scheduled to turn these buildings over to the contractor for demolition on April 13, 2012. A delay in demolition of the 2 buildings in question will result in a contractual excusable delay due to government with monetary damages assessed against the government. If we are not able to fund the monetary damages, the contract will be terminated due to the delays caused by the government. This is expected to cost $454,000 with no work being accomplished on the project. Furthermore, if the project is pieced together around these two buildings, we will incur serious drainage issues, as the location for the buildings is designated for a sand pit for storm water run-off. Without the

sand pit, the drainage has nowhere to run off for proper disposal. If demolition is not performed under our current contract and we terminate the contract, we will not have funding to demolish the buildings in the future. This will result in the retention of buildings that are in a state of disrepair. The project will fail to achieve Silver LEED certification that is a requirement of the contract. The storm water runoff design adds points to the LEED certification which forfeiture of the points will not allow LEED silver certification. Silver certification is a requirement for all new federal facilities under ARRA. If demolition cannot proceed in a timely fashion there is a possibility that the contractor may quit the remainder of the project as we are not allowing them to complete the requirements specified in the contract.

If you have additional questions concerning the attached documents, please contact me at (573) 876-1900.

Sincerely,

Rip Shively
Center Director, CERC

cc: Michael LaFramzo, NRC
cc: Randal Clark, CERC RSO
cc: Carl Orazio, CERC Safety Officer

NRC FORM 313 **U.S. NUCLEAR REGULATORY COMMISSION**
(1-2012)
10 CFR 30, 32, 33,
34, 35, 36, 39, and 40

APPLICATION FOR MATERIALS LICENSE

APPROVED BY OMB: NO. 3150-0120 **EXPIRES: (03/31/2012)**

Estimated burden per response to comply with this mandatory collection request: 4.3 hours. Submittal of the application is necessary to determine that the applicant is qualified and that adequate procedures exist to protect the public health and safety. 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, (3150-0120), 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.

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

APPLICATION FOR DISTRIBUTION OF EXEMPT PRODUCTS FILE APPLICATIONS WITH:

OFFICE OF FEDERAL & STATE MATERIALS AND
ENVIRONMENTAL MANAGEMENT PROGRAMS
DIVISION OF MATERIALS SAFETY AND STATE AGREEMENTS
U.S. NUCLEAR REGULATORY COMMISSION
WASHINGTON, DC 20555-0001

ALL OTHER PERSONS FILE APPLICATIONS AS FOLLOWS:

IF YOU ARE LOCATED IN:

ALABAMA, CONNECTICUT, DELAWARE, DISTRICT OF COLUMBIA, FLORIDA, GEORGIA, KENTUCKY, MAINE, MARYLAND, MASSACHUSETTS, NEW HAMPSHIRE, NEW JERSEY, NEW YORK, NORTH CAROLINA, PENNSYLVANIA, PUERTO RICO, RHODE ISLAND, SOUTH CAROLINA, TENNESSEE, VERMONT, VIRGINIA, VIRGIN ISLANDS, OR WEST VIRGINIA,

SEND APPLICATIONS TO:

LICENSING ASSISTANCE TEAM
DIVISION OF NUCLEAR MATERIALS SAFETY
U.S. NUCLEAR REGULATORY COMMISSION, REGION I
475 ALLENDALE ROAD
KING OF PRUSSIA, PA 19406-1415

IF YOU ARE LOCATED IN:

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

MATERIALS LICENSING BRANCH
U.S. NUCLEAR REGULATORY COMMISSION, REGION III
2443 WARRENVILLE ROAD, SUITE 210
LISLE, IL 60532-4352

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

SEND APPLICATIONS TO:

NUCLEAR MATERIALS LICENSING BRANCH
U.S. NUCLEAR REGULATORY COMMISSION, REGION IV
1600 E. LAMAR BOULEVARD
ARLINGTON, TX 76011-4511

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

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

- ☐ A. NEW LICENSE
- ☑ B. AMENDMENT TO LICENSE NUMBER 24-12728
- ☐ C. RENEWAL OF LICENSE NUMBER

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

Columbia Environmental Research Center (CERC)
4200 New Haven Road
Columbia, MO 65201

3. ADDRESS WHERE LICENSED MATERIAL WILL BE USED OR POSSESSED

4. NAME OF PERSON TO BE CONTACTED ABOUT THIS APPLICATION

Rip Shively

TELEPHONE NUMBER

(573) 876-1900

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

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

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

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

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

9. FACILITIES AND EQUIPMENT.

10. RADIATION SAFETY PROGRAM.

11. WASTE MANAGEMENT.

12. LICENSE FEES *(See 10 CFR 170 and Section 170.31)*
FEE CATEGORY | AMOUNT ENCLOSED $

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

THE APPLICANT AND ANY OFFICIAL EXECUTING THIS CERTIFICATION ON BEHALF OF THE APPLICANT, NAMED IN ITEM 2, CERTIFY THAT THIS APPLICATION IS PREPARED IN CONFORMITY WITH TITLE 10, CODE OF FEDERAL REGULATIONS, PARTS 30, 32, 33, 34, 35 , 36, 39, AND 40, AND THAT ALL INFORMATION CONTANED HEREIN IS TRUE AND CORRECT TO THE BEST OF THEIR KNOWLEDGE AND BELIEF.
WARNING: 18 U.S.C. SECTION 1001 ACT OF JUNE 25, 1948 62 STAT. 749 MAKES IT A C RIMINAL OFFENSE TO MAKE A WILLFULLY FALSE STATEMENT OR REPRESENTATION TO ANY DEPARTMENT OR AGENCY OF THE UNITED STATES AS TO ANY MATTER WITHIN ITS JURISDICTION.

CERTIFYING OFFICER – TYPED/PRINTED NAME AND TITLE	SIGNATURE	DATE
Rip Shively, Director CERC	RS Shively	4/2/2012

FOR NRC USE ONLY

TYPE OF FEE	FEE LOG	FEE CATEGORY	AMOUNT RECEIVED $	CHECK NUMBER	COMMENTS
APPROVED BY				DATE	

Site History Report

US Geological Survey
Department of the Interior

Analytical Building (Building 3) at:
CERC-USGS
4200 New Haven Road
Columbia, MO 65201

April 2, 2012

NRC License No 24-12728-01 History of Analytical Building

The Analytical Building (also known as "Building 3", "New Analytical Building", and "Building B" and first appeared on our NRC License No. 24-12728-01 on September 28, 1978 as part of Amendment 8 to our License (no Docket number).

In summary, use and storage of radioactive materials in Analytical Building were limited to the following:

1.5 mCi of non-volatile ^{51}Chromium Chloride was used from January 1, 1980 to December 30, 1980.

Gas Chromatographs with sealed Nickel-63 Detectors were used from January 4, 1984 to July 1, 1986

Surface wipe monitoring and GM surveys conducted during the period of radioactive material use detected no radiation above background.

No radioactive materials have been used in the since July 1986.

Detailed History of Analytical Building on CERC's NRC License

Inorganic Lab Room 1, Room 2, Room 6 and 7; Organic Lab Room 6, and Room 5 Gas Chromatography Lab were areas where radioactive materials could be used based on a September 7, 1978 letter to NRC Washington DC.

On September 25, 1980, Jim Hogan (RSO of our Center) requested an amendment to license so that we could use radioisotopes in the Analytical Building: "Building B (figure 1) is an analytical chemistry building. It is also 2,400 ft^2 structure of sheet metal construction resting on a 5 inch thick concrete slab. The rooms outlined in red on Figure 3 are the areas that will be used for radioactive tracer studies. Several of these rooms will be equipped with fume hoods. All gamma emitters will be stored in room 2 in a container constructed of 1 inch lead sheets and secured in a locked metal cabinet. "Only radioisotopes covered in our license will be used in these buildings. All of the safety procedures outlined in our original license will be observed in the new buildings. The rooms outlined in red in Figure 3 are rooms 1 and 2 which are Inorganic Chemistry Labs, and rooms 5 (gas chromatography lab), and rooms 6 and 7 which are the Organic Chemistry Labs."

On February 24, 1981 our Center received Amendment 9 of our license (24-12728-01 no Docket Number) which says that we can use licensed materials by procedures contained in applications dated January 16, 1978, April 4, 1978, September 7, 1978, and September 25, 1980.

As part of our May 3, 1983 License Renewal the radiation use areas of the Analytical Buildings was modified to ICAP Room, Inorganic Lab "Room 7", and Organic Lab (Docket No. 03-05146).

As part of the Center's February 14, 1994 License Renewal (Docket No. 030-05146) in Item 9a the Center requested that only Room 7 be designated for radiation use.

In March 2012, Randal Clark, CERC's Radiation Safety Officer conducted an investigation of the historic use of radiation in the Analytical Building by examining the historic radiation license, inventory, use, and monitoring documents of the Center and by interviewing all of the principal radiation users who worked in the building.

Site Description

The Analytical Building (Building 3 on the Center's 1995 NRC License) is part of a 33 acre campus of the Columbia Environmental Research Center (CERC) in Columbia, MO. Building 3 is a 2,400 ft^2 structure of sheet metal construction resting on a 5 inch thick concrete slab that was constructed in 1978. It lies east of the Biology East Building (Building 5 of CERC's 1994 NRC License) and the Main Building (Building 1 of CERC's 1995 NRC License). *See attached Facilities Site Map and Historic Floor Plan for Analytical Building (Building 3).*

CERC conducts research needed to address national and international environmental contaminant issues and effects of habitat alterations on aquatic and terrestrial ecosystems. The radioisotopes are used in laboratory research studies conducted for the development of analytical chemistry methodologies, as tracers in biological systems, and in physiological and biochemical measurements. In general, at CERC radiolabeled compounds are used research studies conducted for the development of analytical chemistry methodologies, as tracers in biological systems, and in physiological and biochemical measurements. CERC radiation workers use very small amounts of radiation in our experiments (usually less than 100,000 DPMs per sample), so most of the radioisotopes that we buy are at 1 mCi or below.

Detailed Radioactive Material Use History of Radiation Use History

No unsealed radioisotopes were stored in the Analytical Building.

From 1978 to March of 1980 no radioisotopes were used in the Analytical Building.

Use of Chromium-51 Chloride (^{51}Cr) in Analytical Building

From January 1, 1980 to December 30, 1980, only 1.5 mCi of ^{51}Cr was used in the Analytical Building.

On March 20, 1980 CERC received 2 mCi of chromium-51 chloride (^{51}Cr) which was stored in Room 19 of the Main Building inside of a lead shielded container. ^{51}Cr has a half-life of 28 days, is a gamma emitter, and is non-volatile. *See attached New Acquisitions Report from January 25, 1980 to January 19, 1981 Acquisition of Cr-51*

Between April 1, 1980 and June 30, 1980 Tom May (principal researcher of the Analytical Building from 1978 to present) used diluted unsealed solutions totaling 1.5 mCi of Chromiun-51 Chloride (Cr-51) in Room 1 and 2 of the Analytical Building (*See 1980 Historic Floor Plan*) in a study to determine species of chromium in water. *See*

attached Letter A Letter from Tom May and the Radiation Use Report for July 3, 1980 Use of Cr-51 in Analytical Building.

All research was conducted behind lead shielding. Samples exposed to the ^{51}Cr were collected in scintillation vials and radiation levels were determined using the Beckman Gamma 8000 Counting System in the Main Building of the Center. The scintillation vials were then collected and shipped out using a regulated radiation waste hauler as part of our normal radiation waste stream to a licensed radiation disposal site.

This is the only use of unsealed radioisotopes in the entire history of the Analytical Building from construction to the present.

The remaining 0.5 mCi of the original purchase was stored in Room 19 of the Main Building until June 30, 1986 it was disposed of after all radiation had half-lifed out. *See Radiation Use Record for April 1, 1986 to June-30, 1986 Disposal of remaining Cr-51 Solutions.*

From July 1, 1980 to July 1, 1984 and to the present time, our records and interviews with researchers indicate that no radiolabelled materials were used in the Analytical Building.

Use of Nickel-63 (^{63}Ni) sealed GC ECD Detectors in Analytical Building

Between January 4, 1984 and July 1, 1984 three Varian 3700 Gas Chromatography (GC) instruments with Nickel-63 (^{63}Ni) ECD sealed detectors were moved into the Organic Gas Chromatography Room of the Analytical Building

On July 2, 1984, two Varian 3700 GCs each with two ^{63}Ni ECD sealed detectors and one Varian 3700 Gas Chromatography with one ^{63}Ni ECD sealed detector for a total of five (n=5) ^{63}Ni ECD sealed detectors were in the Organic Gas Chromatography Room of the Analytical Building. Each of the five ^{63}Ni ECD sealed detectors had 8 mCi of ^{63}Ni for a total of 40 mCi of sealed ^{63}Ni in the Analytical Building.

On January 9, 1985 and July 6, 1985 one Varian 3700 GC with two (n=2) ^{63}Ni ECD sealed detector; one Varian 3700 GC with one ^{63}Ni ECD sealed detector; and one Perkin-Elmer GC with one (n=1) ^{63}Ni ECD sealed detector for a total of four (n=4) ^{63}Ni ECD sealed detectors were in the Organic Gas Chromatography Room of the Analytical Building. Each of the four ^{63}Ni ECD sealed detectors had 8 mCi of ^{63}Ni for a total of 32 mCi of sealed ^{63}Ni in the Analytical Building.

On January 6, 1986 one Varian 3700 GC with two ^{63}Ni ECD sealed detectors each for a total of two (n=2) ^{63}Ni ECD sealed detectors were in the Organic Gas Chromatography Room of the Analytical Building. Each of the two ^{63}Ni ECD sealed detectors had 8 mCi of ^{63}Ni for a total of 16 mCi of sealed ^{63}Ni in the Analytical Building.

All of the Gas Chromatography instruments were used by Jim Zajicek. *See attached Letter B Letter from Jim Zajicek.*

Between January 6, 1986 and July 1, 1986 all of the Gas Chromatography instruments with ^{63}Ni ECDs detectors were moved out of the Analytical Building into Room 16 of the Main Building of our Center.

While the GCs with the ^{63}Ni ECD sealed detectors were in the Analytical Building each ^{63}Ni ECD sealed detector was leaked tested every six months using a surface wipe test and analyzed on a Beckman 3133T Liquid Scintillation instrument by Jim Hogan (RSO). Surface wipe surveys were conducted by using a cotton swab to wipe the ECD detector surface and placing the swab into a scintillation vial containing scintillation cocktail and then counting the vial using a scintillation counter. They were tested on July 2, 1984; January 9, 1985; July 1, 1986; and January 6, 1986. No radiation about background levels was ever detected. *See attached Wipe Survey Test Results for Ni-63 Sealed ECD Detectors July 2, 1984 to January 6, 1986.*

In addition, while the GCs with the ^{63}Ni ECD sealed detectors were in the Analytical Building, Jim Hogan (RSO) monitored the building weekly with a GM survey meter. No radiation above background levels was ever detected. *See attached Radiation Monitoring with GM Survey Meter 1984 to 1986.*

Our inventory and use records and interviews with radiation workers indicate that from July 1986 to the present time no radioactive materials were used or stored in the Analytical Building.

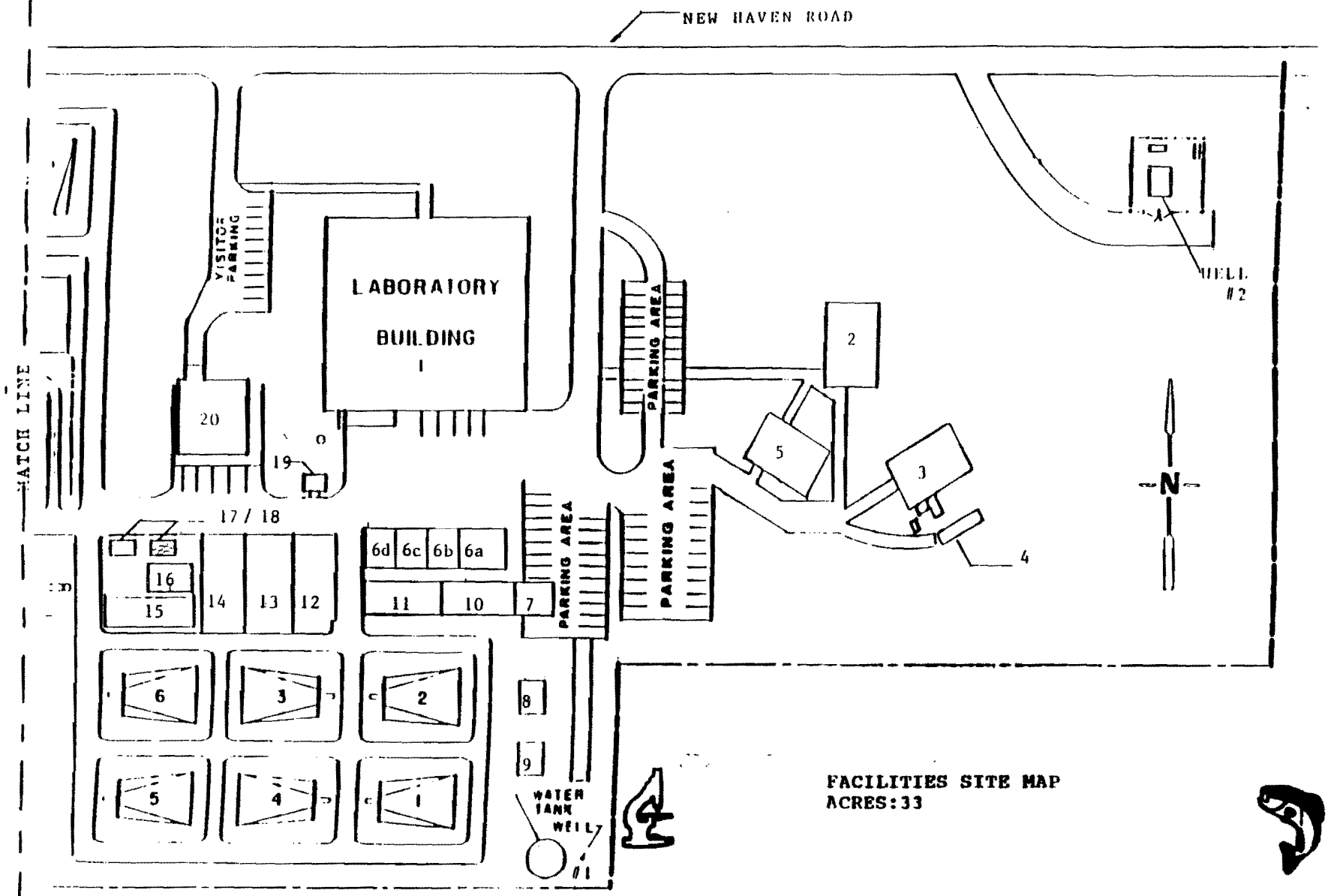
In 1994, a Beckman Gamma 8000 Counting System was moved from the Main Building to the Mechanical Room of the Analytical Building. The instrument was never used for Gamma Radiation Counting while it was in the Analytical Building. It has since been removed from the Building. *See 1995 Historic Floor Plan of Analytical Building.*

Routine Radiation Monitoring of Analytical Building

The Analytical Building was monitored weekly and/or monthly by the Center's RSO using calibrated GM Survey Meters from February, 1984 to September, 1995. No radiation above background was ever detected. From October 1995 to present time the Analytical Building was not monitored using a GM Survey Meter. *See GM Survey Meter Results, Last Survey of Analytical Building, September, 1995.*

Rooms 6 and 7 of Analytical Building were monitored using surface swab survey analyzed in a Liquid Scintillation Counter using a wide window monthly every 6 months from September, 1984 to September 1995. *Surface wipe surveys were conducted by using a cotton swab to wipe a 100 cm^2 surface and placing the swab into a scintillation vial containing scintillation cocktail and then counting the vial using a scintillation counter.* No radiation above background was ever detected. *See attached Surface Wipe Survey Results, Last Survey of Analytical Building, September 1995.*

Facility Site Map and Historic Floor Plans For Analytical Building (Building 3)



FACILITIES SITE MAP
ACRES: 33

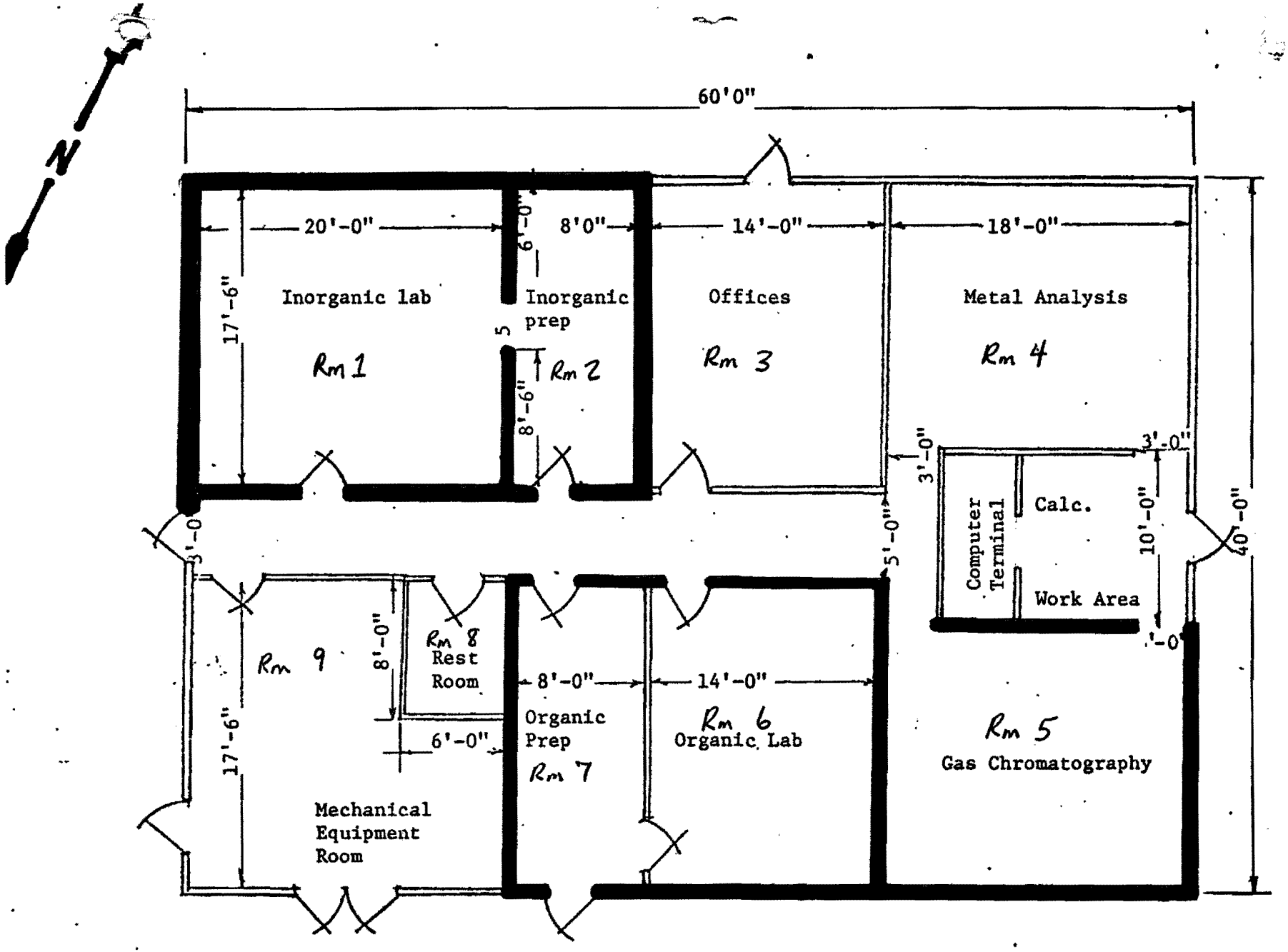
License 24-12728-01

MAP KEY

BUILDING NUMBERS

1. Main Building
2. Conference Building
3. Analytical Building
4. Walk-in Freezer
5. Biology Building
6a. Field Research Offices
6b. Computer Center
6c. Grinding Room
7. Library
8. Vehicle Storage Building
9. Support Storage Building
10. Support Storage Building
11. Support and Biology Storage
12. Fish Culture
13. Ecology Lab/Offices
14. Office Building West
15. Chemistry/Field Research Storage Building
16. Chemical Storage Building
17. Storage Building
18. Storage Building
19. Chemical Storage Building
20. Pollution Abatement Building
21. Laboratory Office (Streams)

1980 Floor Plan for Analytical Building (Building 3)



Analytical Lab

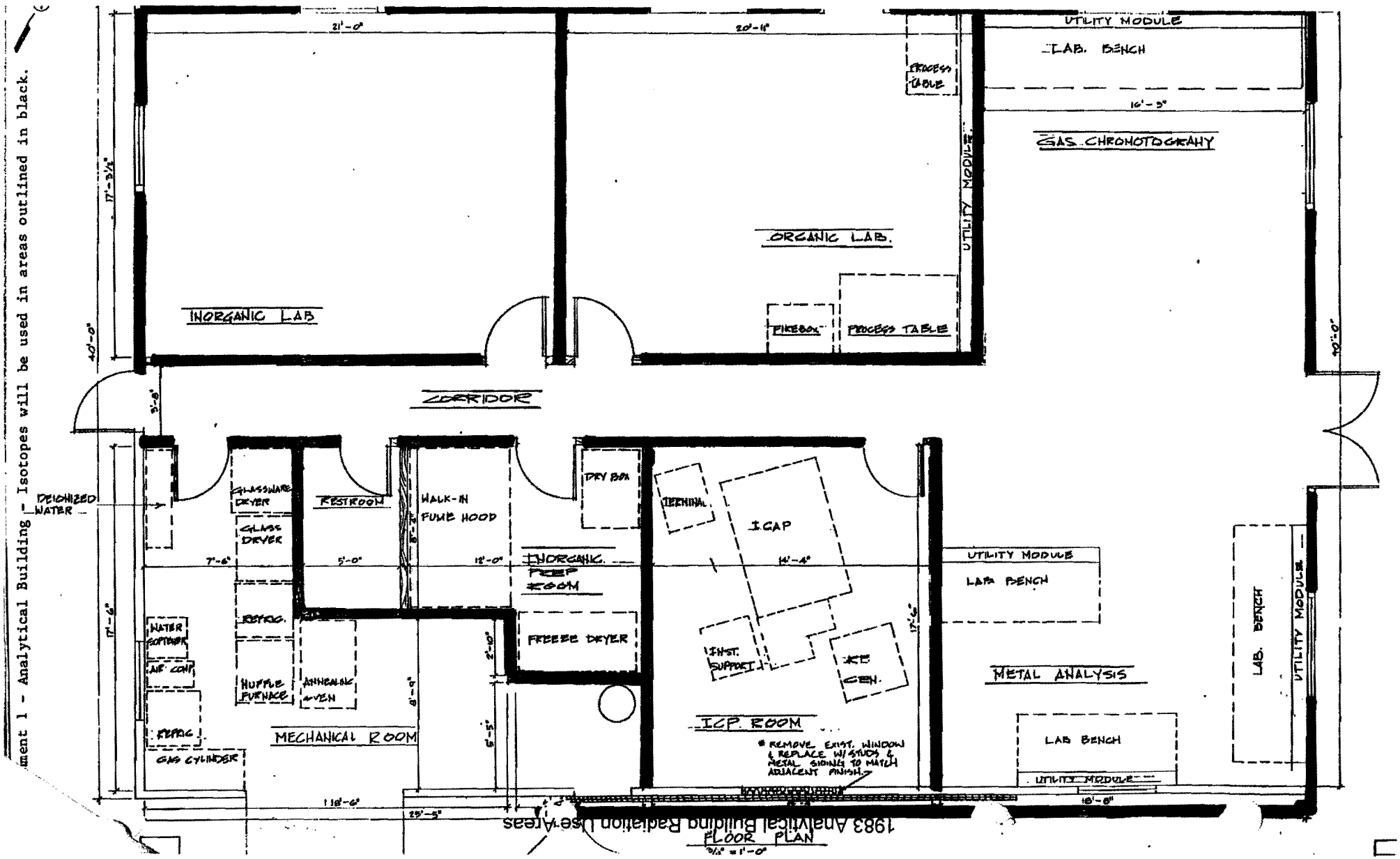
Floor Plan

Figure 2

1980 Analytical Building Radiation Use Areas

1983 Floor Plan for Analytical Building (Building 3)

ment 1 - Analytical Building - Isotopes will be used in areas outlined in black.

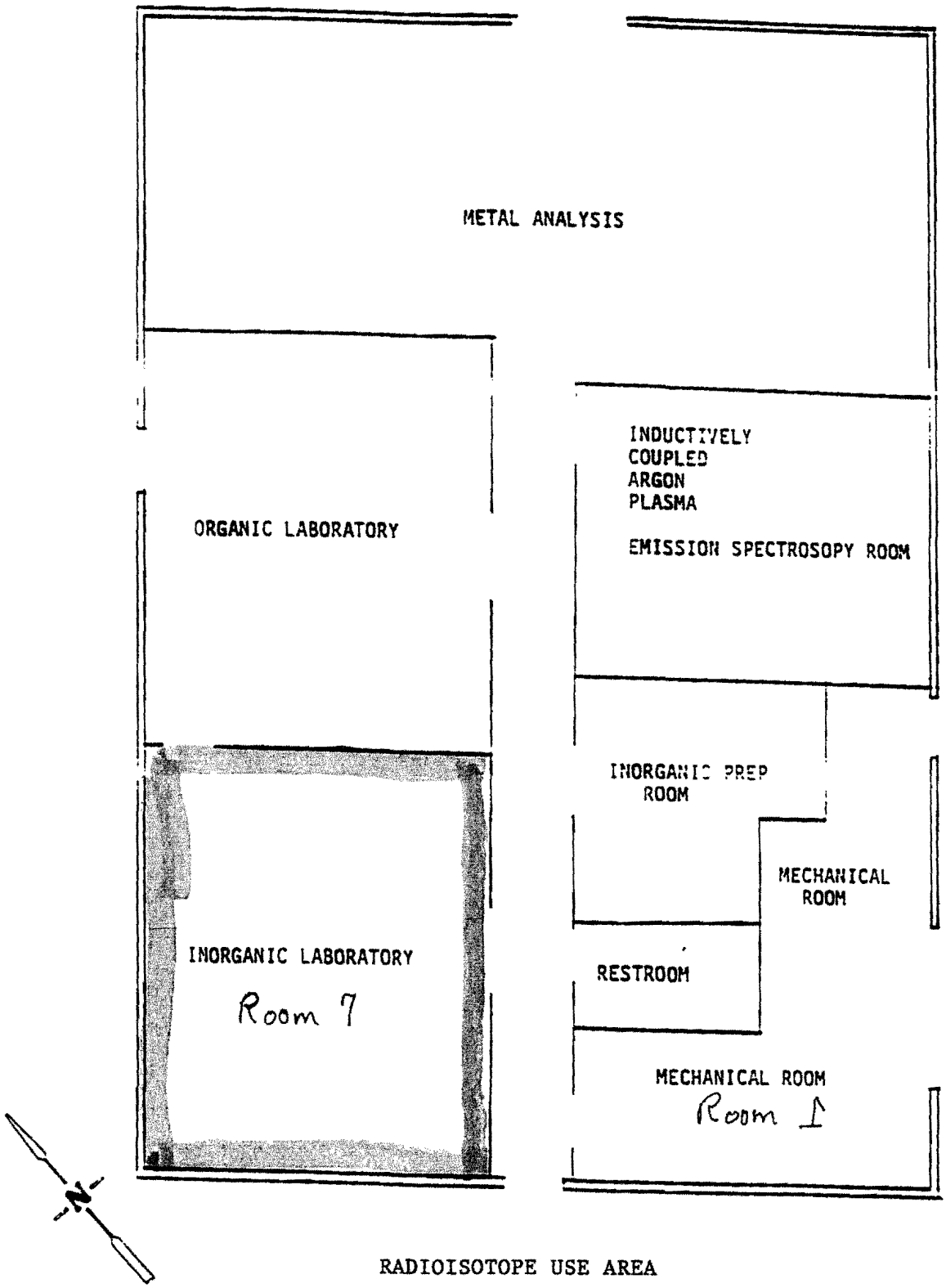


1995 Floor Plan for Analytical Building (Building 3)

Item 9d

1995 Analytical Building Radiation Use Areas

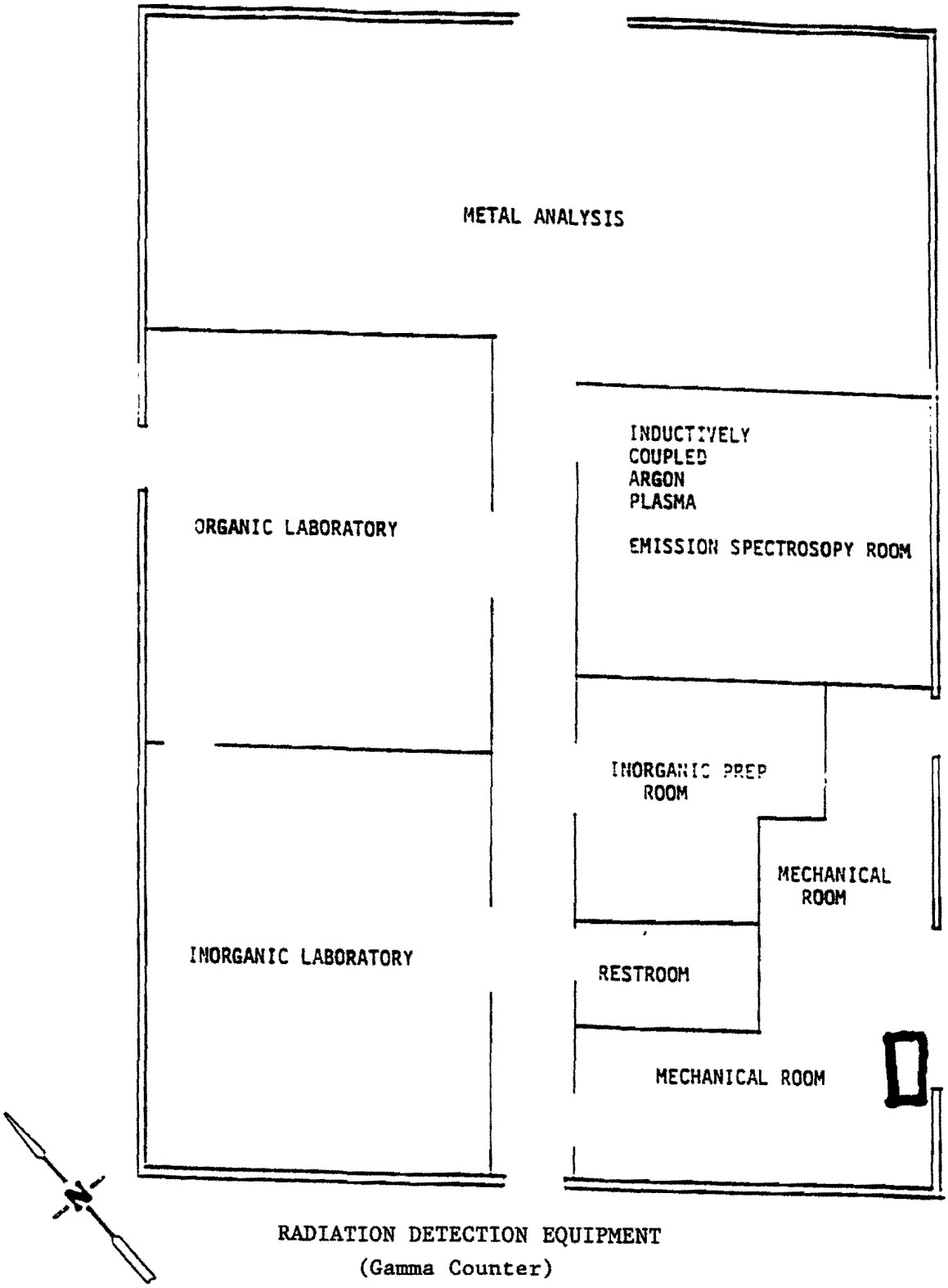
ANALYTICAL BUILDING
BUILDING 3
SQUARE FOOTAGE:2400



RADIOISOTOPE USE AREA

1995 Analytical Building Radiation Use Areas

ANALYTICAL BUILDING
BUILDING 3
SQUARE FOOTAGE:2400



RADIATION DETECTION EQUIPMENT
(Gamma Counter)

New Acquisitions Report

from January 25, 1980 to January 19, 1981

Acquisition of Cr-51

New acquisitions - H^3

Investigator	Compound/Source etc	mCi ±	Totz/mCi	Date

New acquisitions other than C^{14} or H^3

			mCi	Location	
1AY	Cr^{51}	NEN	2	Rm 19	3/20/80
1AY	Se^{75}	NEN	2	"	6/16/80
2AY	Sn^{113}	NEN	2	"	6/16/80
1AY	Se^{75}	NEN	4	"	9/5/80
HRLE	Pb^{210}	Amersham	1	"	1/16/81

Letter A

Letter from Tom May

United States Department of the Interior

U. S. GEOLOGICAL SURVEY

Columbia Environmental Research Center
4200 New Haven Road
Columbia, Missouri 65201

March 29, 2012

Randal Clark
Radiation Safety Officer
Columbia Environmental Research Center

Randal,

I have worked in and been the lead scientist of the CERC's Analytical Building from 1978 to the present.

This is to inform you that in 1980, I used diluted solutions totaling 1.5 mCi of chromium 51 (^{51}Cr) in the CERC Analytical Building. This radionuclide was used to develop a method to determine species of chromium in water. Any residual liquids containing the radionuclide were shipped to a licensed radiation waste hauler for disposal. Any solid waste (e.g. lab paper, etc.) was shipped to in according to NRC regulations to a licensed waste facility. In addition, Jim Zajicek used nickel 63 (^{63}Ni) electron capture detectors, as part of gas chromatography instrumentation, in the building from 1984 to 1985. These chromatographs were moved to another building in the Center in 1986.

To my knowledge these were the only the only radionuclides that were ever present in the Analytical building from its construction to the present. Also, no liquid radionuclides were ever stored in this building.

Thomas May
Leader, Toxic Elements
Columbia Environmental Research Center

Radiation Use Report for July 3, 1980

Use of Cr-51 in Analytical Building

Quarterly Inventory/Radioisotopes
July 3, 1980
Page 1

MM

	Amount used, μCi
Boyle	
1) Acetic acid, Na salt, C^{14}	
2) Pentachlorophenol, C^{14}	
3) $NaHCO_3$, C^{14}	
Buckler	
1) MBC, C^{14}	
Huckins	
1) 4-Chlorophenoxy acetic acid, C^{14}	
2) 2,4-D DMA, C^{14}	
3) Endothall, C^{14}	
4) Naphthalene, C^{14}	
5) Pentachlorophenol, C^{14}	
6) PCB (42% Cl), C^{14}	
7) PCB (54% Cl), C^{14}	
8) TCDD, C^{14} and H^3	
9) 3,4,3',4'-Tetrachlorobiphenyl, C^{14}	
Lehmann	
1) TH-6040, C^{14}	
2) p-Chloroanaline, C^{14}	
May	
1) Cr^{51}	1.5 mCi (1500 μCi)
2) Pb^{210}	none
3) Se^{75}	0.1 mCi (100 μCi)
4) Sn^{113}	none

Radiation Use Record

From April 1, 1986 to June 30, 1986

Disposal of remaining Cr-51 Solutions

USED 4/1/86 THROUGH 6/30/86

INVESTIGATOR	COMPOUND	μCi
1) FAIRCHILD	$NaHCO_3$, C^{14}	2,920
2) HUCKINS	2,5,2',5'-TC Biphenyl, C^{14}	0.21
	3,4,3',4'-TC Biphenyl, C^{14}	0.41
3) JOHNSON, B.T.	Amino acid mixture, C^{14}	0.1
	Glucose, C^{14}	0.1
4) ZAJICEK,	[7-C^{14}] Dibenz-[a,h]-anthracene	0.07
	Dieldrin, C^{14}	0.06
	2,4,5,2',4',5'-HC Biphenyl, C^{14}	0.06
	p,p'-DDT, C^{14}	0.05
	TOTAL:	2,921.06
5) May	Chromium, Cr^{51}	500
	Lead, Pb^{210}	12.63
	Tin, Sn^{113}	2,000

Johnson, B.T. (cont.)

29) Sodium carbonate, C_{14} _____

30) Starch, C_{14} _____

31) 2,5,2'5'-Tetrachlorobiphenyl, C_{14} _____

32) Tri-p-Cresyl phosphate, C_{14} _____

33) Tris-(2,3-dibromopropyl) phosphate, C_{14} _____

Little, E.

1) Methyl parathion, C_{14} _____

2) Sr_{85} _____

3) Selenomethionine, Se_{75} _____

4) Sodium selenite, Se_{75} _____

5) Sodium selenate, Se_{75} _____

May

~~1) Cr_{51}~~ 500 μCi

2) Pb_{210} 12.63 μCi

3) Se_{75} _____

4) Sn_{113} 2,000 μCi

Schwartz

1) Benzo-~~a~~-pyrene, C_{14} _____

2) 2,4,5,2',4',5'-Hexachlorobiphenyl, C_{14} _____

3) PCB, 1254, C_{14} _____

4) Xylene, C_{14} _____

Letter B

Letter from Jim Zajicek

United States Department of the Interior

U. S. GEOLOGICAL SURVEY

Columbia Environmental Research Center
4200 New Haven Road
Columbia, Missouri 65201

April 2, 2012

Randal Clark
U.S. Geological Survey
Columbia Environmental Research Center
4200 New Haven Road
Columbia, MO 65201

Dear Randal:

I have been a chemist at the CERC for over 31 years. While at the CERC I have supervised the use of gas chromatography (GC) instrumentation including several manufactured by Varian and one by Perkin-Elmer that each contained varying numbers of sealed Nickel-63 (^{63}Ni) electron capture detectors (ECDs). These instruments were used to analyze residues of a variety of halogenated pesticides and industrial chemicals in fish tissues extracts as part of the U.S. Department of Interior's, National Pesticide Monitoring Program.

While a member of the CERC's Field Research Branch at our center, between January 4, 1984 and July 1, 1986 three Varian 3700 GCs and one Perkin-Elmer Sigma 3B GC, each with sealed Nickel-63 (^{63}Ni) ECDs, were used under my supervision in the Organic Gas Chromatography Room of the Analytical Building as detailed below.

As of July 1984, these GCs included two (n=2) Varian 3700 GCs each with two (n=2) ^{63}Ni ECD sealed detectors and one (n=1) Varian 3700 Gas Chromatography with one (n=1) ^{63}Ni ECD sealed detector for a total of five (n=5) ^{63}Ni ECD sealed detectors that were housed in the Organic Gas Chromatography Room of the Analytical Building. Each of the five ^{63}Ni ECD sealed detectors had 8 mCi of ^{63}Ni for a total of 40 mCi of sealed ^{63}Ni sources in the Analytical Building.

In 1985 the GC instrumentation included one (n=1) Varian 3700 GC with two (n=2) ^{63}Ni ECDs; one (n=1) Varian 3700 GC with one (n=1) ^{63}Ni ECD; and one (n=1) Perkin-Elmer Sigma series GC with one (n=1) ^{63}Ni ECD for a total of four (n=4) ^{63}Ni ECD sealed detectors that were operated in the Organic Gas Chromatography Room of the Analytical Building. Each of the four ^{63}Ni ECD sealed detectors had 8 mCi of ^{63}Ni for a total of 32 mCi of sealed ^{63}Ni source materials in the Analytical Building.

In January 1986 the GC instrumentation included one (n=1) Varian 3700 GC with two (n=2) ^{63}Ni ECD sealed detectors for a total of two (n=2) ^{63}Ni ECD sealed detectors that were located in the

United States Department of the Interior

U. S. GEOLOGICAL SURVEY

Columbia Environmental Research Center
4200 New Haven Road
Columbia, Missouri 65201

April 2, 2012

Randal Clark
U.S. Geological Survey
Columbia Environmental Research Center
4200 New Haven Road
Columbia, MO 65201

Dear Randal:

I have been a chemist at the CERC for over 31 years. While at the CERC I have supervised the use of gas chromatography (GC) instrumentation including several manufactured by Varian and one by Perkin-Elmer that each contained varying numbers of sealed Nickel-63 (^{63}Ni) electron capture detectors (ECDs). These instruments were used to analyze residues of a variety of halogenated pesticides and industrial chemicals in fish tissues extracts as part of the U.S. Department of Interior's, National Pesticide Monitoring Program.

While a member of the CERC's Field Research Branch at our center, between January 4, 1984 and July 1, 1986 three Varian 3700 GCs and one Perkin-Elmer Sigma 3B GC, each with sealed Nickel-63 (^{63}Ni) ECDs, were used under my supervision in the Organic Gas Chromatography Room of the Analytical Building as detailed below.

As of July 1984, these GCs included two (n=2) Varian 3700 GCs each with two (n=2) ^{63}Ni ECD sealed detectors and one (n=1) Varian 3700 Gas Chromatography with one (n=1) ^{63}Ni ECD sealed detector for a total of five (n=5) ^{63}Ni ECD sealed detectors that were housed in the Organic Gas Chromatography Room of the Analytical Building. Each of the five ^{63}Ni ECD sealed detectors had 8 mCi of ^{63}Ni for a total of 40 mCi of sealed ^{63}Ni sources in the Analytical Building.

In 1985 the GC instrumentation included one (n=1) Varian 3700 GC with two (n=2) ^{63}Ni ECDs; one (n=1) Varian 3700 GC with one (n=1) ^{63}Ni ECD; and one (n=1) Perkin-Elmer Sigma series GC with one (n=1) ^{63}Ni ECD for a total of four (n=4) ^{63}Ni ECD sealed detectors that were operated in the Organic Gas Chromatography Room of the Analytical Building. Each of the four ^{63}Ni ECD sealed detectors had 8 mCi of ^{63}Ni for a total of 32 mCi of sealed ^{63}Ni source materials in the Analytical Building.

In January 1986 the GC instrumentation included one (n=1) Varian 3700 GC with two (n=2) ^{63}Ni ECD sealed detectors for a total of two (n=2) ^{63}Ni ECD sealed detectors that were located in the

Organic Gas Chromatography Room of the Analytical Building. Each of the two ^{63}Ni ECD sealed detectors had 8 mCi of ^{63}Ni for a total of 16 mCi of sealed ^{63}Ni in the Analytical Building.

In the first half of 1986 all of the Gas Chromatography instruments with ^{63}Ni ECDs detectors were moved out of the Analytical Building into Room 16 of the Main Building of our Center.

While the GCs with the ^{63}Ni ECD sealed detectors were in the Analytical Building each ^{63}Ni ECD sealed detector was regularly leaked-tested using a wipe test by Jim Hogan (RSO). To the best of my knowledge, no radiation, above background levels, was ever detected.

In addition, while the GCs with the ^{63}Ni ECD sealed detectors were in the Analytical Building, Jim Hogan (RSO) monitored the building regularly with a GM survey meter. Only background radiation levels were ever detected.

I trust that this summary of my experiences with the use of sealed ^{63}Ni-ECD sources in the CERC Analytical Building will meet your current documentation needs.

Please don't hesitate to get back with me, if you require additional assistance.

Sincerely yours,

James L. Zajicek
Chemist
Biochemistry and Physiology Branch

Wipe Survey Test Results for

Ni-63 Sealed ECD Detectors

July 2, 1984 to January 6, 1986

Note that NAB = "New Analytical Building" or Building 3

GC/Ni^{63} detector survey 7/2/84 background = 50cpm

Instrument		Room	Operator	SFW F	cpm	uCi
Varian 3700 (101)	L	16	RWiedmeyer	360797	0	0
Varian 3700	L	16	RWiedmeyer	634855	0	0
	R				0	0
Varian 3700	R	16	L. Smith	614335	0	0
Varian 3700	R	16	J. Hockins	634552	0	0
Varian 3700	L	17	T Schwartz	614305	0	0
	R				0	0
Varian 3700	R	17	T Schwartz	614339	0	0
Varian 3700	L	17	T Schwartz	614308	113	10^{-6}
Varian 3700 (110)	L	NAB	Zajicek	614351	0	0
	R				0	0
Varian 3700	L	NAB	Zajicek	634768	0	0
Perkin-Elmer Sigma 2B		NAB	Zajicek	614446	0	0
Tracor 223	L	Basement	Zajicek	606932	0	0
(115)	R				0	0

.85	[illegible]	[illegible]
86	0.333	[illegible]
.87	0.339	[illegible]
.88	0.337	[illegible]
.89	0.353	55.6(10%)
[illegible]	0.332	51.8(10%)
.91	0.334	48.9(10%)
.92	0.338	52.1(10%)
.93	0.329	50.7(10%)
.94	0.336	53.1(10%)
.95	0.330	55.4(10%)
.96	0.342	55.9(10%)
.97	0.341	53.9(10%)
.98	0.355	54.9(10%)
200	0.336	59.5(10%)
.98	0.335	52.5(20%)
200	0.323	51.0(20%)

7/6/85

GC/Ni^{63} detector swabs 1/9/85 background 55 cpm

Instrument		Room	Operator	SFW #		cpm	μCi
Varian 3700	L	16	R. Wedemeyer	360797	(36)	0	0
Varian 3700	L	16	R Wedemeyer	634855		0	0
	R					0	0
Varian 3700	R	16	L. Smith	614335		0	0
Varian 3700	R	16	J. Hawkins	634552	(40)	0	0
Varian 3700	R	17	T. Schwartz	614305		0	0
" "	L	"	"	361044		30	~10^{-6}
Varian 3700	R	17	T. Schwartz	614337		0	0
Varian 3700	L	17	T. Schwartz	614308		0	0
	R					0	0
Varian 3700	L	NAB	Zajicek	614351	(46)	0	0
	R					0	0
Varian 3700	L	NAB	Zajicek	634768		0	0
P.E Sigma 2B		NAB	Zajicek	614446		0	0
Con 223	L	Basement	Zajicek	606732		0	0
	R					0	0

37	0.328	48.4(10%)
38	0.322	49.5(10%)
39	0.336	51.8(10%)
	0.328	49.7(10%)
	0.333	51.1(10%)
41	0.332	48.9(10%)
x 42	0.333	84.7(7.0%)
43	0.324	49.6(10%)
44	0.327	50.4(10%)
45	0.320	49.1(10%)
46	0.317	48.0(10%)
47	0.334	53.7(10%)
48	0.325	48.9(10%)
49	0.323	54.8(10%)
50	0.354	52.7(10%)
51	0.349	51.0(10%)

/ Ni^{63} detector swabs 7/6/88 background - 55cpm

Instrument		Room	Operator	SFW II	cpm	μCi
Varian 3700	L	16	R. Wiedmeyer	360797 (185)	0	0
Varian 3700	L	16	R. Wiedmeyer	634855	0	0
	R				0	0
Varian 3700	R	16	L. Smith	614335	0	0
Varian 3700	R	16	I Hucking	634552	in closet	
Varian 3700	L	17	T. Schwartz	361044	0	0
Varian 3700	L	17	T Schwartz	614305	0	0
	R				0	0
Varian 3700	R	17	T. Schwartz	614337	0	0
Varian 3700	A	17	T. Schwartz	614308	0	0
Varian 3700	L	NAB	Zajicek	614351	0	0
	R				0	0
Varian 3700	L	NAB	Zajicek	634768	0	0
G Sigma 2B		NAB	Zajicek	614446	0	0
Varian 223		Basement	Zajicek	606932 (198)	0	0

Ni^{63} detector swabs 1/6/86 background - 55 dpm

Instrument		Room	Operator	SFW#	cpm*	μCi
Tracerlab 3700	L	16	Zajicek	360797 (798)	308	1.39×10^{-4}
Tracerlab 3700	L	NAB	Zajicek	634855	0	0
	R				0	0
Tracerlab 3700	L	17	Schwartz	614335	0	0
	R				0	0
Tracerlab 3700	R	16	Huckeba	634552	0	0
Tracerlab 3700		8	Schwartz	361044	0	0
Tracerlab 3700		8	Schwartz	614305	No Ni^{63} detector	
Tracerlab 3700		17	Schwartz	614337	No Ni^{63} detector	
Tracerlab 3700	R	17	Schwartz	614308 (785)	0	0
Tracerlab 3700	L	NAB	Zajicek	614351	0	0
	R				0	0
Tracerlab 3700	L	16	Zajicek	634768	0	0
G Sigma 2B		16	Zajicek	614446	0	0
Tracor 223	L	Basement	Zajicek	606932	0	0
	R					

* raw data sheets attached to each swab sheet

Radiation Monitoring with GM Survey Meter

1984 to 1986

Radiation monitoring w/ survey meter — Date: 7/22/04

Room	Area	MR/HR
9	hood, sink, bench, rad counting area	0.01 - 0.03
13	hood, sink, bench	0.01 - 0.03
16	GC/Ni^{63} detectors	0.01 - 0.03
18	hoods, shelves, benches, balances	0.01 - 0.03
19	shelves, safes	0.01 - 0.03
23	hoods, sinks, benches, balances	0.01 - 0.03
25	hoods, sinks, benches, balances	0.01 - 0.03
	Waste containers	0.01 - 0.03
35	Fridge	0.01 - 0.03
45	sink, hood, balance	0.01 - 0.03
	New bird bldg	0.01 - 0.03
	New analytical bldg.	0.01 - 0.03

Radiation monitoring w/ survey meter: Date: 7/11/84

Room	Area	MR/HR
9	hood, sink, bench, rad counting area	0.01 - 0.03
13	hood, sink, bench	0.01 - 0.03
16	GC/N_i^{63} detectors	0.01 - 0.03
18	hoods, shelves, benches, balances	0.01 - 0.03
19	shelves, iso	0.01 - 0.03
23	hoods, sinks, benches, balances	0.01 - 0.03
25	hoods, sinks, benches, balances	0.01 - 0.03
	Waste containers	0.01 - 0.03
35	freq	0.01 - 0.03
45	sinks, hood, balances	0.01 - 0.03
	New hood	0.01 - 0.03
	New analytical bldg	0.01 - 0.03

Radiation monitoring w/ survey meter — Date: 8/10/84

Room	Area	MR/HR
9	hood, sink, bench, counting gas	0.01 - 0.03
13	hood, sink, bench	0.01 - 0.03
16	GC/N.^{63} detectors	0.01 - 0.03
18	hoods, shelves, benches, balances	0.01 - 0.03
19	shelves, igloo	0.01 - 0.03
23	hoods, sinks, benches, balances	0.01 - 0.03
25	hoods, sinks, benches, balances	0.01 - 0.03
	Waste containers	0.01 - 0.03
35	frig	0.01 - 0.03
45	sink, hood, balance	0.01 - 0.03
	Raw bird bldg	0.01 - 0.03
	Raw animal bldg	0.01 - 0.03

Radiation monitoring survey notes — Date: 9/11/84

Room	Area	MR/HR
9	hood, sink, bench, & countertops	0.01 - 0.03
13	hood, sink, bench	0.01 - 0.03
16	GC/N.C. detectors	0.01 - 0.03
18	hoods, shelves, benches, balances	0.01 - 0.03
19	shelves, sign	0.01 - 0.03
23	hoods, sinks, benches, balances	0.01 - 0.03
28	hoods, sinks, benches, balances	0.01 - 0.03
	waste containers	0.01 - 0.03
35	frig	0.01 - 0.03
45	sink, hood, balance	0.01 - 0.03
	Kenkel bldg	0.01 - 0.03
	New anal bldg	0.01 - 0.03

RADIATION MONITORING WITH SURVEY METER

DATE: 1/14/85

ROOM/BLDG.	AREA	MR/HR
9	hood, sink, bench, rad counting gear	0.01-0.03
13	hood, sink, bench	0.01-0.03
16	GC/Ni^{63} detectors	0.01-0.03
18	hoods, shelves, benches, balances	0.01-0.03
19	shelves, igloo	0.01-0.03
23	hoods, sinks, benches, balances	0.01-0.03
25	hoods, sinks, benches, balances	0.01-0.03
Waste containers		0.01-0.03
35	frig	0.01-0.03
45	sink, hood, balance	0.01-0.03
New analytical building		0.01-0.03
New biology building		0.01-0.03

RADIATION MONITORING WITH SURVEY METER

DATE: 6/13/85

ROOM/BLDG.	AREA	MR/HR
9	hood, sink, bench, rad counting gear	0.01-0.03
13	hood, sink, bench	0.01-0.03
16	GC/Ni^{63} detectors	0.01-0.03
18	hoods, shelves, benches, balances	0.01-0.03
19	shelves, igloo	0.01-0.03
23	hoods, sinks, benches, balances	0.01-0.03
25	hoods, sinks, benches, balances	0.01-0.03
Waste containers		0.01-0.03
35	frig	0.01-0.03
45	sink, hood, balance	0.01-0.03
New analytical building		0.01-0.03
New biology building		0.01-0.03

RADIATION MONITORING WITH SURVEY METER

DATE: 1/10/86

ROOM/BLDG.	AREA	MR/HR
9	hood, sink, bench, rad counting gear	0.01-0.03
13	hood, sink, bench	0.01-0.03
16	GC/Ni^{63} detectors	0.01-0.03
18	hoods, shelves, benches, balances	0.01-0.03
19	shelves, igloo	0.01-0.03
23	hoods, sinks, benches, balances	0.01-0.03
25	hoods, sinks, benches, balances	0.01-0.03
Waste containers		0.01-0.03
35	frig	0.01-0.03
45	sink, hood, balance	0.01-0.03
New analytical building		0.01-0.03
New biology building		0.01-0.03

Surface Wipe Survey Results

Last Survey of Analytical Building

September, 1995

Date Printed: **Calculated by: R. Clark**

Sample #	Sample Name	Rep #	Date Collected	Date Counted	Scintillation Rack #	Measured Sample DPM	Average Sample DPM	Corrected Sample DPM	Corrected Sample uCi	Corrected Sample pCi
36	East Hall	A3	08/16/95	08/17/95	22-12	57.98		(2.14)	-9.64E-07	-0.001
37	Freezer	Rm47	08/16/95	08/17/95	42-1	59.74		(0.38)	-1.71E-07	-0.000
38	Storage Area	Rm 7	08/16/95	08/17/95	42-2	72.15		12.03	5.42E-06	0.005
39	Conf. Room	G21	08/16/95	08/17/95	42-3	66.87		6.75	3.04E-06	0.003
40	Well Water	MSC	08/16/95	08/17/95	42-4	61.23		1.11	5.00E-07	0.001
41	Lagoon Water	MSC	08/16/95	08/17/95	42-5	63.98		3.86	1.74E-06	0.002
	Total					2,615.59		175.30	7.90E-05	0.079
	Average					63.79	63.79	3.89	1.75E-06	0.002

Notes:

() = negative value.

30	Outside Freezer	A3, Room 34
31	Inside Freezer	A3, Room 34
32	Raceway	A3, Wetlab
33	Hood	A3, Room 35
34	Scintillation Counter	A3, Room 40
35	Sink	A3, Room 42
36	East Hall	A3
37	Freezer	A3, Room 47
DROP	N Sink	A3, Room 47
DROP	South Hood	A3, Room 47
DROP	South Bench	A3, Room 47
38	Storage Area	D25, Room 7
39	Conference Room	G21
40	Well Water	MSC
41	Lagoon Water	MSC

SAM	POS	CH	CPM	2SIG%	TIME	EL TIME	AVG H#	RCM%	EF
36	22-12	1	54.30	8.58	10.00	399.98	88.3	3.11	
	H#: 88, 88, 89								
	RCM: 3.00, 3.11								
					%EFF:93.65	ISO1 DPM	:57.98420		
37	42- 1	1	56.10	8.44	10.00	411.02	81.3	4.88	
	H#: 81, 82, 81								
	RCM: 1.17, 4.88								
					%EFF:93.90	ISO1 DPM	:59.74562		
38	42- 2	1	66.20	7.77	10.00	422.07	129.0	0.11	
	H#: 129, 129, 129								
	RCM: 0.19, 0.11								
					%EFF:91.75	ISO1 DPM	:72.15479		
39	42- 3	1	61.60	8.06	10.00	433.12	122.3	0.21	
	H#: 122, 123, 122								
	RCM: 0.33, 0.21								
					%EFF:92.12	ISO1 DPM	:66.87030		
40	42- 4	1	57.50	8.34	10.00	444.14	81.0	0.33	
	H#: 81, 81, 81								
	RCM: 1.08, 0.33								
					%EFF:93.91	ISO1 DPM	:61.22948		
41	42- 5	1	60.10	8.16	10.00	455.18	80.3	0.58	
	H#: 81, 80, 80								
	RCM: 0.85, 0.58								
					%EFF:93.93	ISO1 DPM	:63.98186		

GM Survey Meter Results

Last Survey of Analytical Building

September, 1995

RADIATION MONITORING WITH SURVEY METER

DATE: 9/5/95

METER # 121076

MAIN BLDG. ROOM	AREA	MR/HR
9	hood, sink, bench, rad counting gear	0.02
13	hood, sink, bench	0.02
16	GC/Ni^{63} detectors	0.02
17	GC/Ni^{63} detectors	0.02
18	hoods, shelves, benches, balances	0.02
19	shelves, igloo	0.02
22	hood, bench, HPLC	0.02
23	hoods, sinks, benches, balances refrig.	0.02
25	hoods, sinks, benches, balances waste containers	0.02
34	refrig.	0.02
40	sink, hood	0.02
42	sink	0.02
47	sink, hood	0.02
BIOL. EAST BLDG.	Genotox lab	0.02
	Aquat. Tox. lab	0.02
ANALYTICAL BLDG.	Room 7	0.02
B34C3 BLDG.	HOODS, SINKS, BENCHES	0.02

Site History Report

US Geological Survey
Department of the Interior

Biology East Building (Building 5) at:
CERC-USGS
4200 New Haven Road
Columbia, MO 65201

April 2, 2012

NRC License No 24-12728-01 History of Biology East Building

The Biology East Building (also known as "Building 5", "New Biology Building", "Building A", "BioEast", and "D25") first appeared on our NRC License No. 24-12728 on February 24, 1981.

In summary, use and storage of radioactive materials in Biology East Building were limited to the following:

> 0.76 mCi of non-volatile Strontium-85 Chloride was used from January 1, 1982 to December 31, 1983.
>
> 0.4 mCi of non-volatile Carbon-14 labeled Sodium Bicarbonate was used from October 1, 1991 to February 7, 1992).
>
> Surface wipe monitoring and GM surveys conducted during the period from 1982 to March 1992 detected no radiation above background.
>
> No radioactive materials have been used in the Biology East Building since March 1992.

Detailed History of Biology East Building on CERC's NRC License

On September 25, 1980, Jim Hogan (RSO of our Center) requested an amendment to license so that we could use radioisotopes in two recently constructed buildings.

> "Building A is a biological laboratory. A 2,400 ft^2 structure of sheet metal construction resting on a 5 inch thick concrete slab. The rooms outlined in red on Figure 2 are the areas that will be used for radioactive tracer studies. Radioactive solutions will be stored in Main Building."
>
> "Only radioisotopes covered in our license will be used in these buildings. All of the safety procedures outlined in our original license will be observed in the new buildings."

On February 24, 1981 our Center received Amendment 9 of our license (24-12728-01 no Docket Number) which says that we can use licensed materials by procedures contained in applications dated January 16, 1978, April 4, 1978, September 7, 1978, and September 25, 1980. This is the first time that the Biology East Building appears on our NRC License.

As part of the Center's February 14, 1994 License Renewal (Docket No. 030-05146) in Item 9a the Center requested that "The following changes are in order: **(1) building 5 the Biology East Laboratory is to be removed from the list of approved use areas".** On May 1, 1995 our Center received Amendment 17 which accepted the changes in the February 14, 1994 License Renewal (Docket No. 030-05146), and thus removing Biology East Laboratory from our license.

In March 2012, Randal Clark, CERC's current Radiation Safety Officer conducted an investigation of the historic use of radiation in the Biology East Building by examining the historic radiation license, inventory, use, and monitoring documents of the Center and by interviewing all of the principal radiation users who worked in the building.

Site Description

The Biology East Building (Building 5 on the Center's 1995 NRC License) is part of a 33 acre campus of the Columbia Environmental Research Center (CERC) in Columbia, MO. It is a 2,400 ft^2 structure of sheet metal construction resting on a 5 inch thick concrete slab that was constructed in 1978. It lies west of the Analytical Building (Building 3 of CERC's 1994 NRC License) and east of the Main Building (Building 1 of CERC's 1995 NRC License). *See attached Facilities Site Map and floor plan from the CERC's 1994 License renewal.*

CERC conducts research needed to address national and international environmental contaminant issues and effects of habitat alterations on aquatic and terrestrial ecosystems. The radioisotopes are used in laboratory research studies conducted for the development of analytical chemistry methodologies, as tracers in biological systems, and in physiological and biochemical measurements. In general, at CERC radiolabeled compounds are used research studies conducted for the development of analytical chemistry methodologies, as tracers in biological systems, and in physiological and biochemical measurements. CERC radiation workers use very small amounts of radiation in our experiments (usually less than 100,000 DPMs per sample), so most of the radioisotopes that we buy are at 1 mCi or below.

Detailed Radioactive Material Use History of Biological East Building

No unsealed or sealed radioisotopes were stored in the Biology East Building.

In 1981 no radioisotopes were used in the Biology East Building.

Use of Strontium-85 Chloride (^{85}Sr) in Biology East Building (January 1, 1982 to December 31, 1983)

Between March 31, 1982 and July 26, 1983 CERC received 1.2 mCi of Strontium-85 chloride (^{85}Sr). This was not stored in Biology East, but was stored in Room 19 of the Main Building (A3) inside of a lead shielded container *(See attached New Acquisitions and Subtractions for 1982 and 1983.)* ^{85}Sr has a half-life of 65 days, is a gamma emitter, and is a non-volatile salt. Ed Little (principal researcher of the Biology East Building from 1979 to 1985) used diluted unsealed solutions totaling 0.76 mCi of the ^{85}Sr in the Laboratory (Room 1) of the Biology East Building in 1983 as a marker during toxicity tests that were conducted in a lead shielded container in a fume hood. *See attached Letter B from Dr. Edward Little, and the Quarterly Radiation Use Reports between January 1, 1982 and December 31, 1983.*

Samples exposed to the ^{85}Sr were collected in scintillation vials and radiation levels were determined using the Beckman Gamma 8000 Counting System in the Main Building of the Center. The scintillation vials were then collected and shipped out using

a regulated radiation waste hauler as part of our normal radiation waste stream to a licensed radiation disposal site. The remaining 0.42 mCi of the original purchase was stored in Room 19 of the Main Building until January 2, 1996 it was disposed of after all radiation had half-lifed out.

Routine surface wipe tests of the hood and lab benches of the Laboratory (Room 1) of the Biology East Building was conducted on July 6, 1982, January 5, 1983, July 5, 1983, and January 4, 1984 by Jim Hogan (RSO). Samples were analyzed in a Beckman 3133T Liquid Scintillation instrument using a wide window. No radiation above background was ever detected. *See Routine Wipe Survey Results for July, 1982 to January 4, 1984.*

Routine weekly monitoring of Room 1 by Jim Hogan, RSO using calibrated GM Survey Meters was conducted from January, 1982 to January, 1984. No radiation above background was ever detected. *See Routine Wipe Survey Results for 1982 to 1984.*

From January, 1984 to August, 1991 our radiation use records and interviews with researchers indicates that no radiation was used in the Biology East Building.

Use of Carbon-14 (^{14}C) labeled Sodium Bicarbonate in Biology East Building (October 1, 1991 to February 7, 1992).

A total of 0.4 mCi of ^{14}C labeled Sodium Bicarbonate, a non-volatile salt, was used in the Biology East Building.

Between October 1, 1991 and February 7, 1992 Jim Fairchild supervised Paul Heine and Nadine Hall in the use of diluted unsealed solutions totaling 0.4 mCi of Carbon-14 (^{14}C) labeled Sodium Bicarbonate in a fume hood in Room 1 of the Biology East Building. Algae were exposed to diluted ^{14}C solutions and the associated ^{14}C were isolated on a membrane. The membrane was placed in a scintillation vial and counted using a Beckman 3600 Liquid Scintillation Counter. The scintillation vials were then collected and shipped out using a regulated radiation waste hauler as part of our normal radiation waste stream to a licensed radiation disposal site. *See attached letter D from Jim Fairchild and the Quarterly Radiation Use Reports between October 1, 1991 and March 31, 1992.*

Routine surface wipe tests of the hood, lab benches, and water bath of the Laboratory (Room 1) of the Biology East Building were conducted on January 6, 1992 and June 4, 1992 by Joe Hunn (RSO). Samples were analyzed in a Beckman LS 6500 Liquid Scintillation instrument using a wide window. No radiation above background was detected. *See Routine Wipe Survey Results for January, 1992 to June, 1992.*

Routine monthly monitoring of the Laboratory (Room 1) of the Biology East Building by Joe Hunn, RSO using calibrated GM Survey Meters was conducted from September, 1991 to April, 1992. No radiation above background was detected. *See Routine GM Meter Survey Results for 1991 to 1992.*

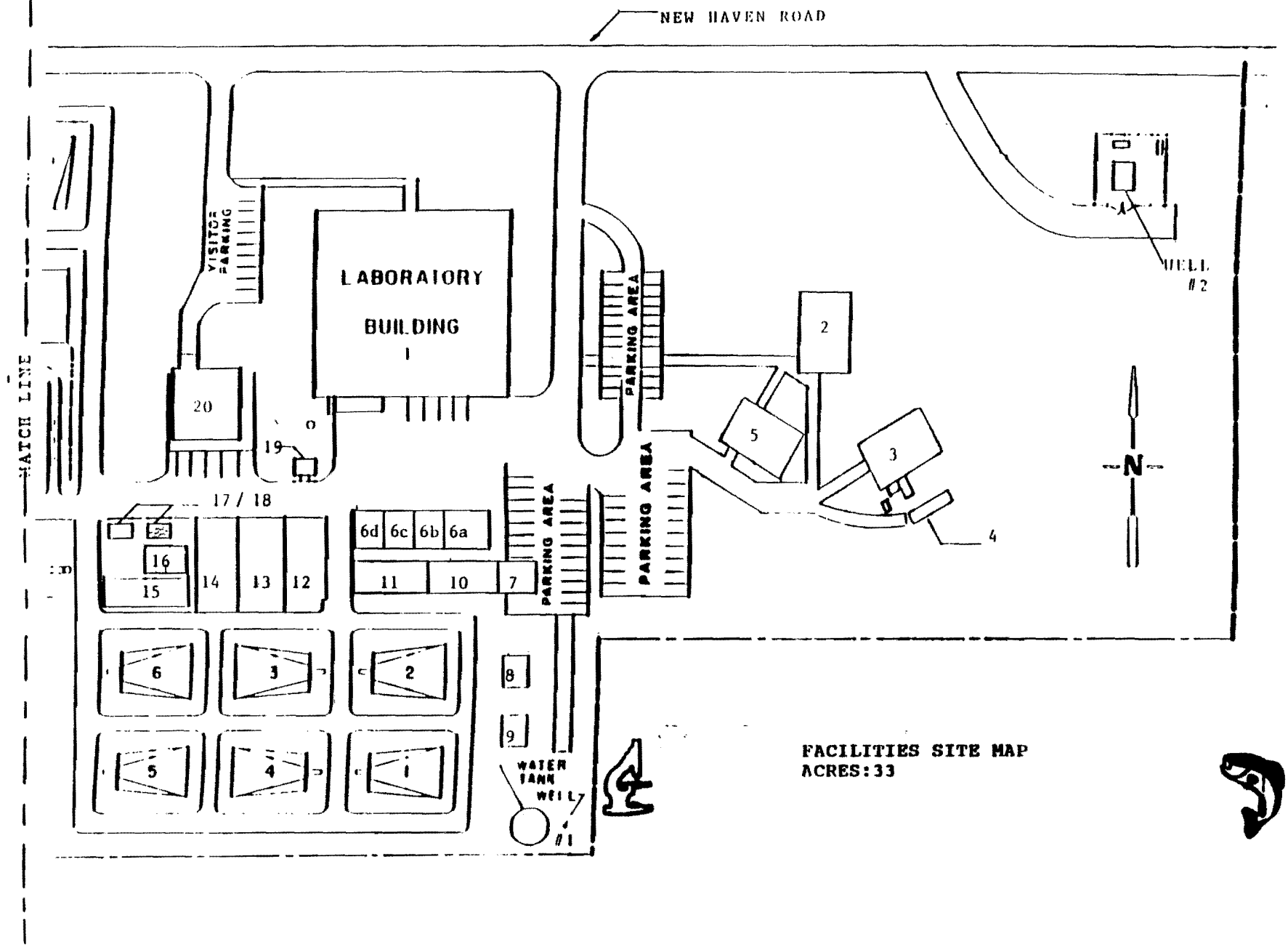
Our inventory and use records and interviews with radiation workers indicate that from March 1992 to the present time no radiation was used in the Biology East Building. *See attached Letter E from Chris Ingersoll.*

Routine Radiation Monitoring of Biology East Building

The Biology East Building was monitored weekly and/or monthly by the Center's RSO using calibrated GM Survey Meters from February, 1982 to August, 1996. No radiation above background was ever detected. From September, 1996 to present time the Biology East Building was not monitored using a GM Survey Meter. *See GM Survey Meter Results, Last Survey of Biology East Building, June, 1996.*

Laboratory (Room 1) of Biology East Building was monitored using surface wipe survey and analyzed in a Liquid Scintillation Counter using a wide window monthly to every 6 months from July 1982 to May 1995. Surface wipe surveys were conducted by using a cotton swab to wipe a 100 cm^2 surface and placing the swab into a scintillation vial containing scintillation cocktail and then counting the vial using a scintillation counter. No radiation above background was ever detected. From June 1995 to present time the Biology East Building was not monitored using wipe survey. *See Surface Wipe Survey Results, Last Survey of Biology East Building, January, 1995.*

Facility Site Map and Historic Floor Plans For Biology East Building (Building 5)



FACILITIES SITE MAP
ACRES: 33

License 24-12728-01

MAP KEY

BUILDING NUMBERS

1. Main Building
2. Conference Building
3. Analytical Building
4. Walk-in Freezer
5. Biology Building

6a. Field Research Offices
6b. Computer Center
6c. Grinding Room

7. Library
8. Vehicle Storage Building
9. Support Storage Building
10. Support Storage Building
11. Support and Biology Storage
12. Fish Culture
13. Ecology Lab/Offices
14. Office Building West
15. Chemistry/Field Research Storage Building
16. Chemical Storage Building
17. Storage Building
18. Storage Building
19. Chemical Storage Building
20. Pollution Abatement Building
21. Laboratory Office (Streams)

1980 Floor Plan for Biology East Building (Building 5)

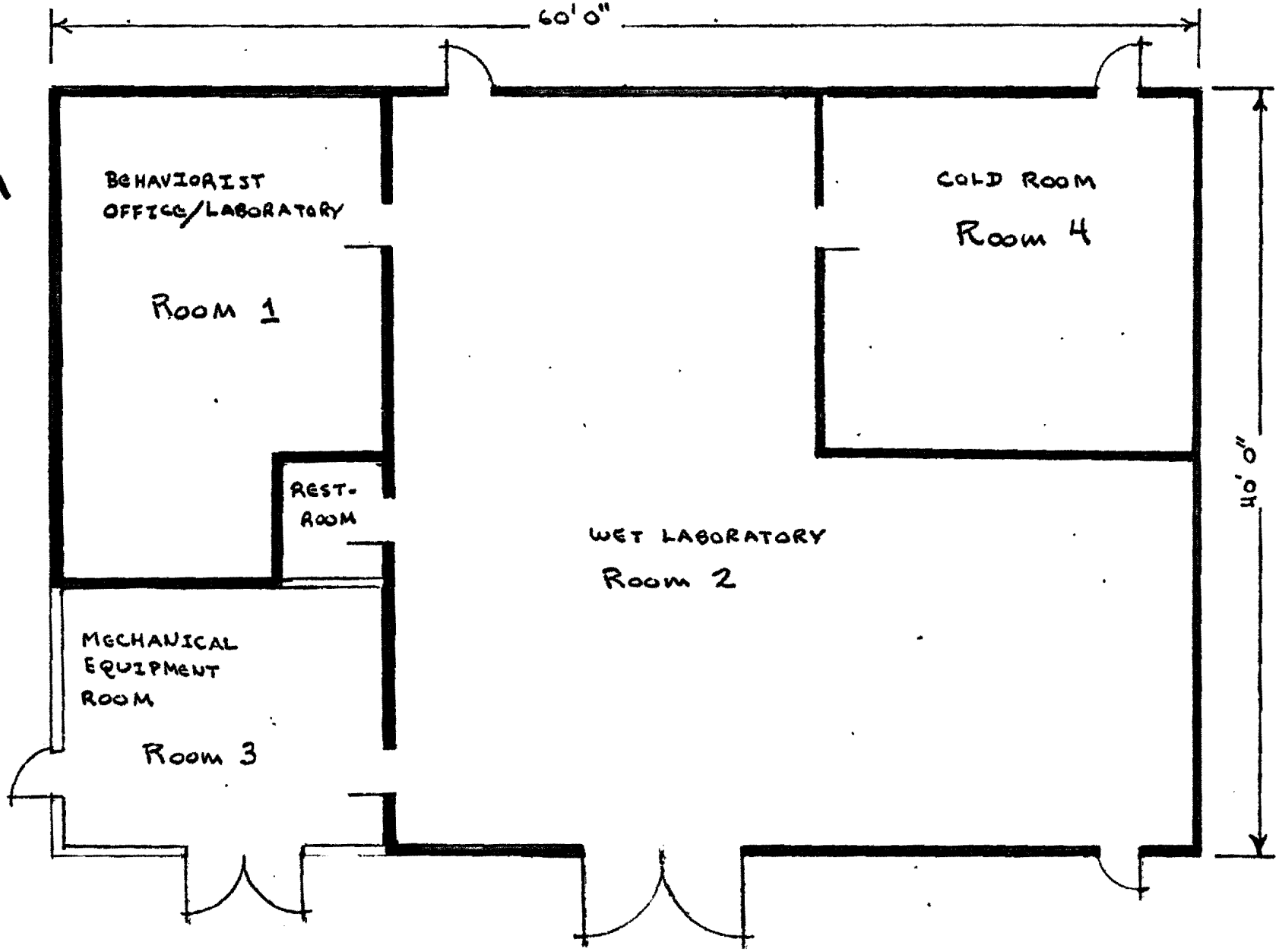


Figure 2

1980 BioEast Building Radiation Use Areas

New Acquisitions and Use Reports

from January, 1982 to December, 1983

Acquisition and Use of Sr-85

New acquisitions: H^3

Investigator	Compound/Source	mCi	Total mCi	Date
	carry over from 1981	1.524		
HAMILTON	corticosterone, H^3	0.125	1.399	3/3/82
FAGACHER	(L-Prolyl-Glycyl-L-Proline)$_n$ [L-Prolyl-4-^{3}H(N)]	0.01	1.409	7/26/82

New acquisitions (other than C^{14} or H^3):

Investigator	Compound/Source	mCi	Total mCi	Date
	Pb^{210}, carry over from '81	1.202		
	Se^{75}, carry over from '81	7.		used up 6/30/82
	Sr^{85}, carry over from '81	0.5		
	Cr^{51}, carry over from '81	0.5		
	Sn^{113}, carry over from '81	2.		
Little	Sr^{85}	0.189	0.311	3/31/82
Little	Sr^{85}	0.500	0.811	5/14/82
Hamilton	Cd^{109}	0.250		
May	Se^{75}	7.0 used	0	6/30/82
Little	Sr^{85}	0.32 used		
Hamilton May	Se^{75}	4	4	7/30/82
May	Se^{75}	2 used	2	12/30/82

Radioisotope current inventory - period 1/14/83 to 1/13/84

New acquisitions: H^3

Investigator	Compound/Source	mCi	Total mCi	Date
	carry over from 1982	1.159	1.159	1/13/83
Febacher	(L-prolyl-glycyl-L-proline)$_n$ [L-prolyl-4-^{3}H(N)]	0.010	1.169	3/22/83

Acquisitions other than C^{14} or H^3

Investigator	Compound/Source	mCi	Total mCi	Date
	carry over from 1982			
	Cadium ^{109}	0.25 mCi		
	Cesium ^{134}	0.09 mCi		
	Chromium ^{51}	0.5 mCi		
	Lead ^{210}	1.2 mCi		
	Strontium ^{85}	0.48 mCi	half lifed out	shipped as waste
	Tin ^{113}	2 mCi		
	Selenium ^{75}	2 mCi		
Little	purchased Sr^{85} - NEN	0.5 mCi	0.98 mCi	6/23/83
"	used Sr^{85} -	0.384	0.496	9/30/83
"	used Sr^{85} -	0.028	0.398	12/31/83

Annual inventory 1/13/83 (Metal isotopes) page 7 of 7 pages

Compound/Isotope	mCi	Investigator	Comment
1) Cadmium ^{109}	0.250	Hamilton	
2) Cesium ^{134} (Cesium hydroxide)	0.090	Smith, L.	
3) Chromium ^{51} (Chromic chloride)	0.500	May	
4) Lead ^{210}	1.0	Hamilton	
5) Lead ^{210}	0.189	"	
6) Lead ^{210}	0.013	May	
7) Strontium ^{85} (Strontium chloride)	0.481	Little, E.	
8) Tin ^{113} (Stannous chloride)	2.0		

Letter C

Letter from Edward Little

United States Department of the Interior

U. S. GEOLOGICAL SURVEY

Columbia Environmental Research Center
4200 New Haven Road
Columbia, Missouri 65201

March 30, 2012

Randal Clark
Radiation Safety Officer
Columbia Environmental Research Center

Randal:

This is to inform you that I used strontium-85 on an intermittent basis from 1982 through 1983 in CERCs Bio-East building where I maintained a laboratory from 1979 to 1985. Diluted solutions of strontium were used as a marker during toxicity tests that were conducted in a lead shielded container in the fume hood of the Room 1 laboratory. The total of 0.71 mCi was used during this period was collected in scintillation vials and then shipped to radiation waste haulers as was unused strontium. To my knowledge this was the only radionuclides used in this building during this period of time and no radionuclides were ever stored in this building.

Edward Little, Ph.D.
Chief: Ecology Branch
Columbia Environmental Research Center

Routine Swab Survey Results for 1982 to 1984

Biology East Building

Monitoring survey/laboratory 7/6/82 background = 50 cpm

Area	cpm	μCi	Area	cpm	μCi
Room 45					
-bench	0	0			
-sink	0	0			
-hood	0	0			
Biology bldg					
-hood	0	0			
-bench	0	0			

Keep on 2 pages

Monitoring survey/Behavioral Lab 1/5/83 Background = 50 cpm

Area	cpm	μCi	Area	cpm	μCi
Room 45					
balance 1st	0	0			
E. end	0	0			
E. hood 1st	0	0			
New biology bldg					
hood	5	2×10^{-6}			
lab bench	6	2×10^{-6}			

Monitoring swabs/laboratory 7/5/83 background - 50cpm

Area	cpm	μCi
Room 45		
balance (237)	0	0
E. sink	0	0
E-hood	0	0
New biology bldg		
hood (240)	0	0
lab bench	0	0

Monitoring swabs/Laboratory 1/4/84 background = 50 cpm

Area	cpm	μCi
Room 45		
balance (55)	0	0
E. side	0	0
E. floor 2	0	0
New biology bldg		
Rm 8 (58)	0	0
lab bench	0	0

Letter D

Letter from Jim Fairchild

United States Department of the Interior

U. S. GEOLOGICAL SURVEY

Columbia Environmental Research Center
4200 New Haven Road
Columbia, Missouri 65201

April 2, 2012

Randal Clark
U.S. Geological Survey
Columbia Environmental Research Center
4200 New Haven Rd.
Columbia, MO 65201

Dear Mr. Clark,

I have been a Research Ecologist at the CERC for 35 years. While at the CERC I have supervised the use of C^{14} sodium bicarbonate for use in carbon uptake studies in algae. This letter is to acknowledge specifically the use of C^{14} sodium bicarbonate in Lab Room 1 of the Bioeast Building.

From 1989 to 1992 I supervised Paul Heine and Nadine Hall who used C^{14} sodium bicarbonate in Lab Room 1 of the Biology East Building for research associated with the GLNPO sponsored research under the direction of Dr. Chris Ingersoll. Total use of chemical for this whole study was 0.4 mCurie. Algae were exposed to C^{14} sodium carbonate in aqueous solution for 4 h periods. At the end of the incubation the algae and associated C^{14} were isolated on a 0.4 um membrane and the membrane was placed in scintillation vials and vials where placed in a scintillation counter for measurement in the Building A3.

Scintillation vials were shipped to a licensed radiation waste hauler for disposal. Any solid waste (e.g. lab paper, etc.) was shipped to in according to NRC regulations to a licensed waste facility.

All work conducted in the Room 1 Lab of Bioeast was conducted by people in accordance with accepted practices, guidelines, and rules by individuals trained by Dr. John Ernst, U. of Missouri Radiation instructor.

Please contact me if I can be of further assistance.

Sincerely,

James F. Fairchild
Research Ecologist

Routine Monitoring with GM Survey Meter Results

1982 to 1984

Biology East Building

Radiation monitoring w/survey meter — date: 3/25/82

Room	Area	MR/HR
9	lab benches, hoods, sinks, x-ray + gamma counters	0.01 - 0.03
12	shield, hood, bench, sink	0.01 - 0.03
13	hoods, sinks, benches	0.01 - 0.03
18	hoods, sinks, balances, benches	0.01 - 0.03
19	shelves, jars	0.01 - 0.03
23	frig, sinks	0.01 - 0.03
25	LS counter, hoods, sinks, benches	0.01 - 0.03
Waste receptacles		0.01 - 0.03
Dilutor #5		not in use
35 - frig		0.01 - 0.03
45 - LS counter, hoods, balances, sinks		0.01 - 0.03
New Geology building		0.01 - 0.03

Radiation monitoring w/survey meter — Date: 4/2/82

Room	Area	MR/HR
9	lab benches, hoods, sinks, x-ray + gamma counter	0.01 - 0.03
12	steel, hood, bench, sink	0.01 - 0.03
13	hoods, sinks, benches	0.01 - 0.03
18	hoods, sinks, balances, benches	0.01 - 0.03
19	shelves,	0.01 - 0.03
23	frig, sinks	0.01 - 0.03
25	LS counter, hoods, sinks, benches	0.01 - 0.03
	Waste receptacles	
	Dilute "S	not in use
35	frig	0.01 - 0.03
45	- LS counter, hoods, balances, sinks	0.01 - 0.03
	New biology building	0.01 - 0.03

Radiation monitoring w/survey meter — Date: 4/9/82

Room	Area	MR/HR
9	Lab benches, hoods, sinks, X-ray + gamma counter	0.01-0.03
12	shield, hood, bench, sink	0.01-0.03
13	hoods, sinks, benches	0.01-0.03
18	hoods, sinks, balances, benches	0.01-0.03
19	shelves	0.01-0.03
23	frig, sinks	0.01-0.03
25	LS counter, hoods, sinks, benches	0.01-0.03
Waste receptacles		0.01-0.03
Diater #5		not in use
35 - frig		0.01-0.03
45 - LS counter, hoods, balances, sinks		0.01-0.03
New biology building		0.01-0.03

Radiation monitoring w/ survey meter date: 5/7/82

Room	Area	MR/HR
9	lab benches, hoods, sinks, x-ray & gamma counters	0.01 - 0.03
12	shield, hood, bench, sink	0.01 - 0.03
13	hoods, sinks, benches	0.01 - 0.03
18	hoods, sinks, balances, benches	0.01 - 0.03
19	shelves	0.01 - 0.03
23	frig, sinks	0.01 - 0.03
25	LS counter, hoods, sinks, benches	0.01 - 0.03
	Waste receptacles	0.01 - 0.03
	D Suite II S	not in use
35	- frig	0.01 - 0.03
45	- LS counter, hoods, balances, sinks	0.01 - 0.03
	New biology building	0.01 - 0.03

Radiation monitoring w/survey meter — date: 6/4/82

Room	Area	MR/HR
9	- lab benches, hoods, sinks, x-ray and gamma counters	0.01-0.03
12	- shield, hood, bench, sink	0.01-0.03
13	- hoods, sinks, benches	0.01-0.03
18	- hoods, sinks, balances, benches	0.01-0.03
19	- shelves	0.01-0.03
23	- frig, sinks	0.01-0.03
25	- LS counter, hoods, sinks, benches	0.01-0.03
Waste receptacles		0.01-0.03
Diluters #s		not in use
35	- frig	0.01-0.03
45	- LS counter, hoods, balances, sinks	0.01-0.03
New biology building		0.01-0.03

Radiation monitoring w/survey meter Date: 6/17/82

Room Area	MR/Hr
9 - lab benches, hoods, sinks, x-ray & gamma counters	0.01-0.03
12 - shield, hood, bench, sink	0.01-0.03
13 - hoods, sinks, benches	0.01-0.03
18 - hoods, sinks, balances, benches	0.01-0.03
19 - shelves	0.05-0.07
23 - frig, sinks	0.01-0.03
25 - LS counter, hoods, sinks, balances	0.01-0.03
Waste receptacles	0.01-0.03
Dilutors	not in use
35 - frig	0.01-0.03
45 LS counter, hoods, balances, sinks	0.01-0.03
New biology lobby	0.01-0.03

Radiation monitoring w/survey meter Date: 7/24/8:

Room	Area	MR/hR
9	lab benches, hoods, sinks, x-ray + gamma counter	0.01-0.03
12	shield, hood, bench, sink	0.03-0.05
13	hoods, sinks, benches	0.01-0.03
18	hoods, sinks, balances, benches	0.01-0.03
19	shelves	0.01-0.03
23	frig, sinks	0.01-0.03
25	LS counter, hoods, sinks, balances	0.01-0.03
	Waste receptacles	0.01-0.03
	Dilutor #5 (in operation, but no stock present)	0.01-0.03
35	frig	0.01-0.03
45	LS counter, hoods, balances, sinks	0.01-0.03
	New biology bldg	0.01-0.03

Radiation Use Reports

between October 1, 1991 to March 31, 1992

Use of C-14 in Biology East Building

Paul H.

Quarterly Inventory/Radioisotopes

Fabacher

1) Albumin, ^{14}C (lot 2284-201) _____

2) (L-Prolyl-Glycyl-L-Proline), [L-Prolyl-4-^{3}H(N)] (lot 1621-009) _____

Feltz

1) Benzo[a]pyrene [1,3,6-^{3}H] _____

2) 2,2',3,3',5,5'-Hexachlorbiphenyl, ^{14}C (lot 31318-1) _____

3) 1,2,3,4,6,7,8,9,-Octachloro(U-^{14}C)dibenzo-p-dioxin _____

4) TCDF, ^{14}C _____

Gale

1) $^{134}CsOH$ (lot 960) _____

2) Dodecanoic acid (Carboxyl-^{14}C) _____

3) Fluorene, ^{14}C _____

4) Dimilin, ^{14}C _____

5) Elcosane, chlorinated, ^{14}C _____

6) PCA, ^{14}C _____

7) Pentachlorophenol, ^{14}C (lot 70906 and lot 70802) _____

8) TCDD, ^{3}H _____

Heine

1) Dyfonate, ^{14}C (5-16-85) _____

2) $NaHCO_3$, ^{14}C (lot 1289, lot 1089, and lot 0289) _____

3) $NaHCO_3$, ^{14}C (lot 21560359) 100 mCi

Fabacher

1) Albumin, ^{14}C (lot 2284-201) _____

2) (L-Prolyl-Glycyl-L-Proline), [L-Prolyl-4-^{3}H(N)] (lot 1621-009) _____

Feltz

1) Benzo[a]pyrene [1,3,6-^{3}H] _____

2) 2,2',3,3',5,5'-Hexachlorbiphenyl, ^{14}C (lot 31318-1) _____

3) 1,2,3,4,6,7,8,9,-Octachloro(U-^{14}C)dibenzo-p-dioxin _____

4) TCDF, ^{14}C _____

Gale

1) $^{134}CsOH$ (lot 960) _____

2) Dodecanoic acid (Carboxyl-^{14}C) _____

3) Fluorene, ^{14}C _____

4) Dimilin, ^{14}C _____

5) Elcosane, chlorinated, ^{14}C _____

6) PCA, ^{14}C _____

7) Pentachlorophenol, ^{14}C (lot 70906 and lot 70802) _____

8) TCDD, ^{3}H _____

Heine

1) Dyfonate, ^{14}C (5-16-85) _____

2) $NaHCO_3$, ^{14}C (lot 1289, lot 1089, and lot 0289) 0 used up

3) $NaHCO_3$, ^{14}C (lot 21560359) 300 uci

1/29/92 100 uci
2/6/92 100 uci
2/7/92 100 uci

28V
30V
58V

there are 14, 20 uci ampules left.

PRH
4/17/92

Routine GM Meter Results

For 1991 to 1992

Biology East Building

RADIATION MONITORING WITH SURVEY METER DATE: 9-19-91

MAIN BLDG. ROOM	AREA	MR/HR
9	hood, sink, bench, rad counting gear	0.02
13	hood, sink, bench	0.02
16	GC/Ni^{63} detectors	0.02
17	" "	0.02
18	hoods, shelves, benches, balances	0.02
19	shelves, igloo	0.02
23	hoods, sinks, benches, balances refrig.	0.02
25	hoods, sinks, benches, balances waste containers, GC/Ni^{63} detector	0.02
34	refrig	0.02
35	refrig	0.02
40	sink, hood	0.02
45	sink, hood, balance	0.02
47	sink, hood	0.02
Biol. East Bldg.	Genotox lab	0.02
	Aquat. Tox. lab	0.02

RADIATION MONITORING WITH SURVEY METER DATE: 11-11-91

MAIN BLDG. ROOM	AREA	MR/HR
9	hood, sink, bench, rad counting gear	0.02
13	hood, sink, bench	0.02
16	GC/Ni^{63} detectors	0.02
17	GC/Ni^{63} detectors	0.02
18	hoods, shelves, benches, balances	0.02
19	shelves, igloo	0.04
23	hoods, sinks, benches, balances refrig.	0.02
25	hoods, sinks, benches, balances waste containers, GC/Ni^{63} detector	0.02
34	refrig	0.02
35	refrig	0.02
40	sink, hood	0.02
45	sink, hood, balance	0.02
47	sink, hood	0.02
Biol. East Bldg.	Genotox lab	0.02
	Aquat. Tox. lab	0.02

RADIATION MONITORING WITH SURVEY METER DATE: 1-17-92

MAIN BLDG. ROOM	AREA	MR/HR
9	hood, sink, bench, rad counting gear	0.02
13	hood, sink, bench	0.02
16	GC/Ni^{63} detectors	0.02
17	GC/No^{63} detectors	0.02
18	hoods, shelves, benches, balances	0.02
19	shelves, igloo	0.04
23	hoods, sinks, benches, balances ~~refrig.~~	0.02
25	hoods, sinks, benches, balances waste containers, GC/Ni^{63} detector	0.02
34	refrig	0.02
35	refrig	0.02
40	sink, hood	0.02
45	sink, hood, balance	0.02
47	sink, hood	0.02
BIOL. EAST BLDG.	Genotox lab	0.02
	Aquat. Tox. lab	0.02

RADIATION MONITORING WITH SURVEY METER DATE: 3-11-92

MAIN BLDG. ROOM	AREA	MR/HR
9	hood, sink, bench, rad counting gear	0.02
13	hood, sink, bench	0.02
16	GC/Ni^{63} detectors	0.02
17	GC/No^{63} detectors	0.02
18	hoods, shelves, benches, balances	0.02
19	shelves, igloo	0.04
23	hoods, sinks, benches, balances refrig.	0.02
25	hoods, sinks, benches, balances waste containers, GC/Ni^{63} detector	0.02
34	refrig	0.02
35	refrig	0.02
40	sink, hood	0.02
45	sink, hood, balance	0.02
47	sink, hood	0.02
BIOL. EAST BLDG.	Genotox lab	0.02
	Aquat. Tox. lab	0.02

RADIATION MONITORING WITH SURVEY METER DATE: 3-27-92

MAIN BLDG. ROOM	AREA	MR/HR
9	hood, sink, bench, rad counting gear	0.02
13	hood, sink, bench	0.02
16	GC/Ni^{63} detectors	0.02
17	GC/No^{63} detectors	0.02
18	hoods, shelves, benches, balances	0.02
19	shelves, igloo	0.04
23	hoods, sinks, benches, balances refrig.	0.02
25	hoods, sinks, benches, balances waste containers, GC/Ni^{63} detector	0.02
34	refrig	0.02
35	refrig	0.02
40	sink, hood	0.02
45	sink, hood, balance	0.02
47	sink, hood	0.02
BIOL. EAST BLDG.	Genotox lab	0.02
	Aquat. Tox. lab	0.02

Routine Wipe Survey Results

For January 1992 to June, 1992

Biology East Building

Swab Survey January 1992

1-6-92 R. Clark
J.B. Dunn

	cpm	μCi
Biol East		
sink - East	1	0.4×10^{-6}
sink - South	8	3.6×10^{-6}
table - E	3	1.4×10^{-6}
water bath	7	3.2×10^{-6}
Biohazard hood - E	0	0
Water		
1) well	2	0.9×10^{-6}
2) effluent	1	0.4×10^{-6}
Blank		
238		
14 - solvent		
3) blank		
room 18		
Hood - W (Small)		
47)	0	0
48)		
hood blank		

* both sample from both outside + inside freezer

Hunn PAGE: 1

SER:10 ID:RAN PRESET TIME: 10.00 MON 06 JAN 1992 11:20
AMPLE REPEAT: 1 CYCLE REPEAT: 1 SCR:N RS232:N
-3 AGC:Y BCF:N RCM:Y
-TIME: 0.10 INT:999.95
HANNEL 1-LL: 0 UL: 670 2SIGMA: 0.50 BKG SUB: 0.00 BKG 2SIG: 0.00 LSR: 0

INGLE LABEL DPM, SET UP ON SUN 04 AUG 1991 17:01
NKNOWN ID: UNKNOWN REPLICATES: 1
NKNOWN NORM FACTOR:0 1.00000 UNKNOWN UNITS:DPM
ENCH MODE:H CALCULATE COEFF:N HALF LIFE(DAYS):N
ENCH COEFF A: 4.567723 B:-0.0005046 C:0.00000248 D:-0.0000000146
TANDARD ID:NEW BECKMAN C-14
ENCH LIMITS LOW:2.000 HIGH:308.3 $\bar{X}$ B6 = 29.6 CPM

NM	POS	CH	CPM	2SIG%	TIME	EL. TIME	AVG H#	RCM%	ERR	
1	18- 1	1	44.30	9.50	10.00	10.97	71.3	34.65		Room 9 hood
	H#: 71, 71, 72					%EFF:93.60	ISO1 DPM	:47.32874		
2	18- 2	1	28.00	11.95	10.00	22.02	61.3	5.93		Room 9 sink
	H#: 61, 62, 61					%EFF:93.95	ISO1 DPM	:29.80411		
3	18- 3	1	32.90	11.03	10.00	33.08	52.7	*****		Room 9 bench
	H#: 53, 52, 53					%EFF:94.24	ISO1 DPM	:34.90926		
4	18- 4	1	34.20	10.81	10.00	44.16	55.7	12.46		Room 13 hood
	H#: 56, 55, 56					%EFF:94.14	ISO1 DPM	:36.32859		
5	18- 5	1	30.00	11.55	10.00	55.22	56.7	4.99		Room 13 sink
	H#: 57, 56, 57					%EFF:94.11	ISO1 DPM	:31.87865		
6	18- 6	1	31.60	11.25	10.00	66.29	53.0	5.10		Room 13 bench
	H#: 52, 53, 54					%EFF:94.23	ISO1 DPM	:33.53412		
7	18- 7	1	31.70	11.23	10.00	77.35	52.3	6.20		Room 16 HP373736
	H#: 52, 52, 53					%EFF:94.26	ISO1 DPM	:33.63206		
8	18- 8	1	31.90	11.20	10.00	88.42	52.7	5.76		Room 16 HP 367898
	H#: 53, 53, 52					%EFF:94.24	ISO1 DPM	:33.84818		
9	18- 9	1	29.50	11.64	10.00	99.48	60.0	6.22		Room 17 HP373725
	H#: 60, 60, 60					%EFF:93.99	ISO1 DPM	:31.38548		
0	18-10	1	32.30	11.13	10.00	110.54	60.3	4.32		Room 17 HP373857
	H#: 60, 60, 61					%EFF:93.98	ISO1 DPM	:34.36880		
1	18-11	1	31.40	11.29	10.00	121.60	52.0	4.40		Room 17 V614397 (LS)
	H#: 52, 52, 52					%EFF:94.27	ISO1 DPM	:33.30954		
2	18-12	1	30.80	11.40	10.00	132.64	52.3	4.32		Room 17 V614397 (RS)
	H#: 53, 52, 52					%EFF:94.26	ISO1 DPM	:32.67720		
3	16- 1	1	34.80	10.72	10.00	143.77	53.3	10.12		Room 18 balance
	H#: 54, 53, 53					%EFF:94.22	ISO1 DPM	:36.93427		

#	POS	UN	LPM	25(6)	TME	EL TIME	AVG H#	RCM%	ERR	
	26- 7 1		31.20	11.33	10.00	343.07	58.7	7.44		Room 40 Hood
	H#: 58, 59, 59									
32	26- 8 1		29.10	11.72	%EFF:94.04 ISO1 DPM			:33.17799		Room 45 Hood
	H#: 58, 58, 58				10.00	354.13	58.0	6.82		
33	26- 9 1		31.30	11.30	%EFF:94.06 ISO1 DPM			:30.93733		Room 45 Sink
	H#: 52, 54, 53				10.00	365.19	53.0	7.48		
34	26-10 1		30.80	11.40	%EFF:94.23 ISO1 DPM			:33.21576		Room 45 Bench-S
	H#: 62, 61, 62				10.00	376.26	61.7	11.94		
35	26-11 1		34.50	10.77	%EFF:93.93 ISO1 DPM			:32.78868		Room 47 Sink
	H#: 54, 53, 54				10.00	387.29	53.7	28.80		
36	26-12 1		39.00	10.13	%EFF:94.21 ISO1 DPM			:36.62052		Room 47 Bench-N+W
	H#: 61, 61, 61				10.00	396.35	61.0	19.36		
37	22- 1 1		34.20	10.81	%EFF:93.96 ISO1 DPM			:41.50804		Room 47 Bench-S
	H#: 54, 55, 54				10.00	409.47	54.3	5.69		
38	22- 2 1		30.00	11.55	%EFF:94.19 ISO1 DPM			:36.31092		Biol E Sink-E
	H#: 52, 52, 52				10.00	420.54	52.0	6.59		
39	22- 3 1		36.70	10.44	%EFF:94.27 ISO1 DPM			:31.82440		Biol E Sink-N
	H#: 58, 57, 58				10.00	431.61	57.7	7.44		
40	22- 4 1		32.40	11.11	%EFF:94.07 ISO1 DPM			:39.01265		Biol E Table-E
	H#: 52, 53, 53				10.00	442.68	52.7	7.64		
1	22- 5 1		36.00	10.54	%EFF:94.24 ISO1 DPM			:34.37872		Biol E Waterbath
	H#: 61, 62, 62				10.00	453.80	61.7	16.81		
2	22- 6 1		28.90	11.76	%EFF:93.93 ISO1 DPM			:38.32443		Biol E Biohaz Hood E
	H#: 51, 52, 52				10.00	464.86	51.7	3.16		
3	22- 7 1		31.00	11.36	%EFF:94.28 ISO1 DPM			:30.65394		Well water
	H#: 79, 79, 79				10.00	475.90	79.0	2.66		
4	22- 8 1		30.50	11.45	%EFF:93.33 ISO1 DPM			:33.21590		Effluent water
	H#: 79, 81, 81				10.00	486.91	80.3	4.56		
	22- 9 1		27.30	12.10	%EFF:93.28 ISO1 DPM			:32.69710		Solvent Blank
	H#: 52, 52, 52				10.00	497.95	52.0	8.09		
	22-10 1		30.50	11.45	%EFF:94.27 ISO1 DPM			:28.96020		Blank
	H#: 52, 53, 53				10.00	508.99	52.7	9.46		
	22-11 1		29.20	11.70	%EFF:94.24 ISO1 DPM			:32.36268		Room 18 - Small Hood
	H#: 52, 52, 52				10.00	520.07	52.3	7.40		
					%EFF:94.27 ISO1 DPM			:30.97575		

Survey June 1992 (2)

	CPM	μCi
lab East		
sink-E	3	1.4×10^{-6}
sink-W	1	0.4×10^{-6}
table-E	3	1.4×10^{-6}
water bath	86	39×10^{-6}
Bio hzd	3	1.4×10^{-6}
ood-E	~~KBS~~	
water		
well	1	0.4×10^{-6}
effluent	0	0
Blanks		
solvent	0	0
solvent		
swab	0	0
	0	0
200 m IS bench-S	3	1.4×10^{-6}

Letter E

Letter from Chris Ingersoll

United States Department of the Interior

U. S. GEOLOGICAL SURVEY

Columbia Environmental Research Center
4200 New Haven Road
Columbia, Missouri 65201

April 2, 2012

Randal Clark
U.S. Geological Survey
Columbia Environmental Research Center (CERC)
4200 New Haven Rd.
Columbia, MO 65201

Dear Mr. Clark,

I have been a Research Fish Biologist at the CERC for 26 years. During this time period, I have coordinated all studies conducted in the Biology East Facility. Other than use of C^{14} sodium bicarbonate in Lab Room 1 under the direction of Jim Fairchild (as described in a separate letter to you), there has been no use of radiation in that building for the past 26 years.

Please contact me if I can be of further assistance.

Sincerely,

Chris Ingersoll

Dr. Chris Ingersoll

Surface Wipe Survey Results

Last Survey of Biology East Building

January, 1995

Date Printed: 03/10/95 Calculated by: R. Clark

Sample Name	Sample Location	Rep #	Date Collected	Date Counted	Sample #	Measured Sample DPM	Average Sample DPM	Corrected Sample DPM	Corrected Sample uCi	Corrected Sample pCi
Sink, South	A3, Room 40		01/06/95	01/06/95	28	59.36		2.97	1.34E-06	0.001
Island Bench	A3, Room 40		01/06/95	01/06/95	29	57.95		1.57	7.06E-07	0.001
Hood	A3, Room 40		01/06/95	01/06/95	30	56.46		0.07	3.29E-08	0.000
Sink	A3, Room 42		01/06/95	01/06/95	31	58.59		2.20	9.92E-07	0.001
East Hall	A3		01/06/95	01/06/95	32	53.24		(3.14)	-1.42E-06	-0.001
Sink, North	A3, Room 47		01/06/95	01/06/95	33	55.57		(0.81)	-3.67E-07	-0.000
South Hood	A3, Room 47		01/06/95	01/06/95	34	54.90		(1.49)	-6.71E-07	-0.001
South Bench	A3, Room 47		01/06/95	01/06/95	35	69.80		13.42	6.04E-06	0.006
East Sink	D13, Wet Lab		01/06/95	01/06/95	36	55.25		(1.13)	-5.09E-07	-0.001
North Sink	D13, Wet Lab		01/06/95	01/06/95	37	53.59		(2.79)	-1.26E-06	-0.001
East Bench	D13, Wet Lab		01/06/95	01/06/95	38	56.80		0.41	1.86E-07	0.000
South Diluter	D13, Wet Lab		01/06/95	01/06/95	39	57.56		1.18	5.30E-07	0.001
East Hood	D13, Bio-Haz.		01/06/95	01/06/95	40	58.11		1.73	7.79E-07	0.001
South Sink	D13, Bio-Haz.		01/06/95	01/06/95	41	53.92		(2.47)	-1.11E-06	-0.001
West Incubator	D13, Bio-Haz.		01/06/95	01/06/95	42	68.00		11.62	5.23E-06	0.005
Storage Area	D25, Room 7		01/06/95	01/06/95	43	60.13		3.75	1.69E-06	0.002
Conf. Room	G21				44	51.51		(4.87)	-2.20E-06	-0.002

SAM	POS	CH	CPM	2SIG%	TIME	EL TIME	AVG H#	RCM%	EF
36	22-12	1	54.30	8.58	10.00	399.93	88.3	3.11	
	H#: 88, 88, 89								
	RCM: 3.00, 3.11								
					%EFF:93.65	ISO1 DPM	:57.98420		
37	42- 1	1	56.10	8.44	10.00	411.02	81.3	4.88	
	H#: 81, 82, 81								
	RCM: 1.17, 4.88								
					%EFF:93.90	ISO1 DPM	:59.74562		
38	42- 2	1	66.20	7.77	10.00	422.07	129.0	0.11	
	H#: 129, 129, 129								
	RCM: 0.19, 0.11								
					%EFF:91.75	ISO1 DPM	:72.15479		
39	42- 3	1	61.60	8.06	10.00	438.12	122.3	0.21	
	H#: 122, 123, 122								
	RCM: 0.38, 0.21								
					%EFF:92.12	ISO1 DPM	:66.87030		
40	42- 4	1	57.50	8.34	10.00	444.14	81.0	0.33	
	H#: 81, 81, 81								
	RCM: 1.08, 0.33								
					%EFF:93.91	ISO1 DPM	:61.22948		
41	42- 5	1	60.10	8.16	10.00	455.18	80.3	0.58	
	H#: 81, 80, 80								
	RCM: 0.35, 0.58								
					%EFF:93.93	ISO1 DPM	:63.98186		

GM Survey Meter Results

Last Survey of Biology East Building

June, 1996

RADIATION MONITORING WITH SURVEY METER DATE: 7/22/96

MAIN BLDG. ROOM	AREA	MR/HR
9	hood, sink, bench, rad counting gear	0.02
13	hood, sink, bench	0.02
~~16~~ 64	GC/Ni^{63} detectors	0.02
~~17~~ 64	GC/Ni^{63} detectors	0.02
65	HOODS, BENCHES, SHELVES, BALANCES	0.02
18	hoods, ~~shelves~~, benches, ~~balances~~	0.02
19	shelves, igloo	0.02
22	hood, bench, HPLC	0.02
23	hoods, sinks, benches, balances refrig.	0.02
25	hoods, sinks, benches, balances waste containers	0.02
34	refrig.	0.04
40	sink, hood, SCINTILLATION COUNTER	0.02
42	sink	0.02
47	sink, hood	DELETE
BIOL. EAST BLDG.	Genotox lab	0.02
	Aquat. Tox. lab	0.02
ANALYTICAL BLDG.	Room 7	DELETE
B_3 & C_3 BLDG.	HOODS, SINKS, BENCHES	0.02
WALK IN COOLER	SHELVES	0.02

From: (573) 875-5399
James Quade

4200 New Haven Rd

Columbia, MO 65201

Origin ID: COUA

FedEx Express

J12101112190225

Ship Date: 02APR12
ActWgt: 1.0 LB
CAD: 101619468/INET3250

Delivery Address Bar Code

Ref #
Invoice #
PO #
Dept #

SHIP TO: (573) 875-5399 X 0 BILL SENDER

Aaron McCraw
U. S. Nuclear Regulatory Commission
2443 WARRENVILLE RD STE 210

LISLE, IL 60532

TUE - 03 APR A1
FIRST OVERNIGHT

TRK# 7934 0501 4326
0201

N1 BDFA

60532
IL-US
ORD

512G1/C44D/A278

After printing this label:
1. Use the 'Print' button on this page to print your label to your laser or inkjet printer.
2. Fold the printed page along the horizontal line.
3. Place label in shipping pouch and affix it to your shipment so that the barcode portion of the label can be read and scanned.

Warning: Use only the printed original label for shipping. Using a photocopy of this label for shipping purposes is fraudulent and could result in additional billing charges, along with the cancellation of your FedEx account number.

Use of this system constitutes your agreement to the service conditions in the current FedEx Service Guide, available on fedex.com.FedEx will not be responsible for any claim in excess of $100 per package, whether the result of loss, damage, delay, non-delivery,misdelivery,or misinformation, unless you declare a higher value, pay an additional charge, document your actual loss and file a timely claim.Limitations found in the current FedEx Service Guide apply. Your right to recover from FedEx for any loss, including intrinsic value of the package, loss of sales, income interest, profit, attorney's fees, costs, and other forms of damage whether direct, incidental,consequential, or special is limited to the greater of $100 or the authorized declared value. Recovery cannot exceed actual documented loss.Maximum for items of extraordinary value is $500, e.g. jewelry, precious metals, negotiable instruments and other items listed in our ServiceGuide. Written claims must be filed within strict time limits, see current FedEx Service Guide.