U.S. Environmental Protection Agency
Western Ecology Division:

Radiological Surveys
and Facilities Decommissioning
NRC Radioactive Materials License
No. 36-12343-02

VOLUME I

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U.S. Environmental Protection Agency, Western Ecology Division:
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Table of Contents

Table of Contents (cont'd)

U.S. Environmental Protection Agency
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Radiological Surveys and facilities Decommissioning NRC Radioactive Materials License No. 36-12343-02

Introduction

The U.S. Environmental Protection Agency Western Ecology Division: Radiological Surveys and facilities Decommissioning, NRC Radioactive Materials License No. 36-2343-02 Volumes I and II contain the status and radiological survey results of the numerous rooms and areas used for environmental research involving radiotracers and radioactive sealed sources. Research involving the use of radioactive materials spans nearly a 30 year history at the EPA Research Laboratory in Corvallis, Oregon, under NRC License No 36-12343-02. The use of radioactive materials at the Newport, Oregon, facility is limited to approximately 9 years under the present license.

These two volumes are organized by rooms and grouped by buildings. The use of radioisotopes and the final status of each area is discussed room by room. There are seven main groupings of rooms by buildings: Chemical Storage Building (CSB) and Main Building (MB) both at the Corvallis facility, L, S, and Waste Storage at the Newport facility, Plant Ecology Building (PEB , WRF, or WLD), Terrestrial Ecophysiological Research Facility (TERA), Terrestrial Ecological Research Facility (TERF), and Willamette Research Station (WRS or WFTS) all in Corvallis. These room discussions include the final radiological contamination surveys as well as the historical surveys of the work areas. These records demonstrate that the areas were maintained as contaminate-free radioisotope work spaces. Reports on the CSB and MB are found in Volume I. Volume II contains the reports on Newport, PEB, TERA, TERF, and WRS. Summary tables listing results of the final radiological surveys; the radioisotopes used at these facilities, the quantities, and their forms; and a listing of abbreviations, a glossary, and maps of the facilities and rooms are found in the front of both volumes.

Radiological total (fixed + removable) and removable contamination survey results are expressed as dpm/100 cm^2, Bq/100 cm^2 and or picoCi/100 cm^2 in this report. We deviated from the NRC request for data to be expressed in MBq/100 cm^2 because of the very low levels of contamination. As you will see, 98% of our survey results fell into the range of 0 – 1.0 Bq/100 cm^2. The majority of the isotope use was hydrogen-3, carbon-14, and nickel-63, all of which are soft beta emitters (0.018 – 0.156 MeV max.). Sulfur-35 (0.167 MeV beta max.) was employed for a short time in small quantities. These soft-beta emitters pose little or no external radiation hazard in the quantities we handled. The other isotopes used at our facilities (phosphorus-32, chromium-51, and rubidium-86), are strong beta or gamma emitters, or both. However, the half-life for these isotopes is relatively short (14 – 87 days). Any contamination at our facilities has fully decayed since the last use (1990). Therefore we did not conduct room surveys

for radiation levels or calculate external radiation doses for our facilities. Any external radiation dose would have been picked up or flagged when performing the total contamination surveys.

Finally, surveys were not performed outside the buildings. We did not contaminate any soil or water (ponds etc). We did not use radioisotopes outside the laboratory environment.

Abbreviations and Glossary

Bkgrd = Background

Bq = Becquerel

CEB = Coastal Ecology Branch (Newport Facility)

CERL- Corvallis Environmental Research Laboratory (now called WED)

Check Source = Refers to an radioisotope source that is used as a reference radioactive source or standard which is either fixed on a surface or sealed into a container.

CSB = Chemical Storage Building

CPM = counts per minute

Dpm = disintegrations per minute

E = East

ECD = Electron Capture Detector

ERL-C = Environmental Research Laboratory – Corvallis (now called WED)

Ex = Exhaust. Used to refer to a ventilation exhaust vent or duct.

GC = Gas Chromatograph

GFPC = Gas Flow Proportional Counter

G-M = Geiger-Muller

Fixed = Used to refer to non-removable contamination.

HVAC = Heating, Ventilation, and Air Conditioning

LLD_{95} = Lower Limits of Detection at he 95% confidence level

LSC = Liquid Scintillation Counter

MB = Main Building

N = North

NA = Not Applicable

ND = Not determined

NEW = Newport

Non- removable = Use to refer to contamination that can not be readily removed from surfaces without abrasion.

PCEB = Pacific Coastal Ecology Branch (Newport Facility)

PCi = picoCuries

PEB = Plant Ecology Building

Removable = Refers to contamination that can readily be removed from surfaces.

Rm = Room

S = South

S Source = Sealed Source

Std = Standard. Refers to a radioisotope source that is used for a analytical standard.

TERA = Terrestrial Ecophysiological Research Area

TERF = Terrestrial Ecology Research Facility

Tracer = A radioisotope that is in a loose form (liquid, solid, or gas).

W = West

WED = Western Ecology Division

WFTS = Western Fish Toxicology Station

WLD = Wildlife Building (also called PEB)

WRF = Wildlife Research Facility (also called PEB)

WRS = Willamette Research Station

Summary of EPA-WED Contamination Surveys

Bld	Room	Last Use	Form (Tracer or Sealed Source)	Total Contamination Survey		Removable Contamination Survey		Mechanical Surveys (Yes/No)	Supporting Surveys (Yes/No)	Meets Decommission Criteria for H^3, C^{14},P^{32},S^{53},Ni^{63}, and Rb^{86} (Yes/No)	Notes
				#	Range dpm/100 cm^2 (Bq/100 $cm^{2)}$	#	Range dpm/100 cm^2 (Bq/100 $cm^{2)}$				
CSB	1	2004	Tracer/ S Source	23	0	23	0 - 41 (0 - 0.68)	Yes	Yes	Yes	
MB	126	1983	Tracer/ S Source	16	0	16	0 - 55 (0 - 0.92)	Yes	Yes	Yes	
MB	130	1994	Tracer/ S Source	13	0	20	0 - 31 (0 - 0.52)	Yes	Yes	Yes	
MB	131	1984	Tracer/ S Source	6	0	---	---	No	Yes	Yes	
MB	132	1990	Tracer/ S Source	12	0	12	0 - 24 (0 - 0.40)	Yes	Yes	Yes	
MB	133	1983	Tracer/ S Source	6	0	---	---	No	Yes	Yes	
MB	134	1996	Tracer/ S Source	23	0	33	0 - 14 (0 - 0.23)	Yes	Yes	Yes	
MB	138	1990	Tracer	12	0	12	0 - 22 (0 - 0.36)	Yes	Yes	Yes	
MB	149	1982	Sealed Source	4	0	4	0	No	No	Yes	
MB	150	1981	Sealed Source	4	0	4	0 - 21 (0 - 0.35)	No	Yes	Yes	
MB	155	NA	NA	6	0	---	---	No	No	Yes	
MB	159	1980	Tracer/ S Source	8	0	---	---	No	Yes	Yes	
MB	173	NA	NA	8	0	---	---	No	No	Yes	
MB	190	2004	Tracer/ S Source	38	0	38	0 - 239 3.98	Yes	Yes	Yes	Note 1
MB	204	1989	Tracer/ S Source	5	0	---	---	No	Yes	Yes	
MB	226	1980	Tracer	9	0	9	0 - 23 (0 - 0.38)	No	Yes	Yes	

Summary of EPA-WED Contamination Surveys

Bld	Room	Last Use	Form (Tracer or Sealed Source)	Total Contamination Survey		Removable Contamination Survey		Mechanical Surveys (Yes/No)	Supporting Surveys (Yes/No)	Meets Decommission Criteria for H^3, C^{14},P^{32},S^{53},Ni^{63}, and Rb^{86} (Yes/No)	Notes
				#	Range dpm/100 cm^2 (Bq/100 $cm^{2)}$	#	Range dpm/100 cm^2 (Bq/100 $cm^{2)}$				
MB	228	1990	Tracer/ S Source	16	0	16	0 - 53 (0 - 0.88)	Yes	Yes	Yes	
MB	232	1999	Tracer/ S Source	48	0	30	0 - 36 (0 - 0.6)	Yes	Yes	Yes	
MB	236	1999	Tracer/ S Source	92	0	95	0	No	Yes	Yes	Notes 2
MB	246	2004	Tracer/ S Source	45	0	60	0 - 2 (0 - 0.03)	Yes	Yes	Yes	
MB	248	1981	Tracer/ S Source	8	0	8	0	No	Yes	Yes	
MB	250	1981	Tracer/ S Source	9	0	9	0 - 36 (0 - 0.6)	No	Yes	Yes	
MB	256	2001	Tracer/ S Source	34	0	46	0 - 139 (0 - 2.3)	Yes	Yes	Yes	
MB	258	1999	Tracer/ S Source	9	0	47	0 - 143 (0 - 2.4)	Yes	Yes	Yes	
MB	262	1986	Tracer	6	0	----	----	Yes	Yes	Yes	
MB	266	1996	Tracer/ S Source	24	0	35	0	Yes	Yes	Yes	
MB	270	1996	Tracer/ S Source	14	0 - 200 (0 - 3.0)	57	0 - 258 (0 - 4.3)	Yes	Yes.	Yes	
MB	282	1982	Tracer/ S Source	11	0	11	0 - 61 (0 - 1.02)	No	Yes	Yes	
MB	284	1996	Tracer/ S Source	25	0 - 525 (0 - 9)	25	0	Yes	Yes	Yes	
MB	290	1992	Sealed Source	----	----	10	0 - 14 (0 - 0.23)	No	Yes	Yes	
MB	292	1990	Tracer	10	0	10	0 -21 (0 - 0.35)	No	Yes	Yes	
MB	294	1990	Tracer	15	0	15	0 - 26 0 - 0.43	No	Yes	Yes	

Summary of EPA-WED Contamination Surveys

Bld	Room	Last Use	Form (Tracer or Sealed Source)	Total Contamination Survey		Removable Contamination Survey		Mechanical Surveys (Yes/No)	Supporting Surveys (Yes/No)	Meets Decommission Criteria for H^3, C^{14},P^{32},S^{53},Ni^{63}, and Rb^{86} (Yes/No)	Notes
				#	Range dpm/100 cm^2 (Bq/100 $cm^{2)}$	#	Range dpm/100 cm^2 (Bq/100 $cm^{2)}$				
NEW	L106	1997	Sealed Source	6	0	9	0	No	No	Yes	
NEW	L108	2004	Tracer/ S Source	10	0	31	0	Yes	Yes	Yes	
NEW	L123	pre-1994	Tracer	10	0	29	0	Yes	No	Yes	
NEW	S118	pre-1994	Tracer	7	0	30	0	Yes	No	Yes	
NEW	Waste	2004	Tracer	5	0	10	0	Yes	Yes	Yes	
NEW	General	NA	NA	----	----	13	0	No	No	Yes	
PEB/WLD	115/118	1988	Tracer	----	----	numerous	0 - 49 (0 - 0.82)	Yes	Yes	Yes	
TERA	Control Rm	2002	Sealed Source	----	----	10	0 - 26 (0 - 0.43)	No	Yes	Yes	
TERF	8-23-3/4	1990	Tracer	8	0	11	0	No	Yes	Yes	
TERF	105	1983	Sealed Source	25	0	0	0	Yes	No	Yes	
TERF	113	1993	Tracer	5	0	15	0	Yes	Yes	Yes	
TERF	HB	1993	Tracer	17	0	8	0	No	Yes	Yes	
WRS	10	1986	Tracer/ S Source	13	0	----	----	Yes	Yes	Yes	
WRS	11	1992	Tracer/ S Source	10	0	----	----	Yes	Yes	Yes	
WRS	12	1986	Tracer/ S Source	12	0	11	0 - 28 (0 - 0.46)	Yes	Yes	Yes	
WRS	43	1986	Tracer	5	0	----	----	No	No	Yes	

Summary of EPA-WED Contamination Surveys

Bld	Room	Last Use	Form (Tracer or Sealed Source)	Total Contamination Survey		Removable Contamination Survey		Mechanical Surveys (Yes/No)	Supporting Surveys (Yes/No)	Meets Decommission Criteria for H^3, C^{14},P^{32},S^{53},Ni^{63}, and Rb^{86} (Yes/No)	Notes
				#	Range dpm/100 cm^2 (Bq/100 $cm^{2)}$	#	Range dpm/100 cm^2 (Bq/100 $cm^{2)}$				
WRS	44	1986	Tracer	7	0	----	----	No	Yes	Yes	

Summary of EPA-WED Contamination Surveys

Cell: L16
Comment: Note 1: The fume hood was removed in 2003.

Cell: L21
Comment: Note 2: Hood was removed from the laboratory in 2003.

Summary of EPA-WED
HVAC/Mechanical Contamination Surveys

Bld	Room	Last Use	Form (Tracer or Sealed Source)	Removable Contamination Survey Range dpm/100 cm^2 (Bq/100 $cm^{2)}$	Meets Decommission Criteria for H^3, C^{14},P^{32},S^{53},Ni^{63}, and Rb^{86} (Yes/No)	Notes
CSB	1	2004	Tracer/ S Source	0	Yes	
MB	126	1983	Tracer/ S Source	0 - 22 (0 - 0.37)	Yes	
MB	130	1994	Tracer/ S Source	0 - 281 (0 - 0.47)	Yes	
MB	132	1990	Tracer/ S Source	0 - 50 (0 - 0.83)	Yes	
MB	134*	1996	Tracer/ S Source	0 - 14 (0 - 0.23	Yes	*Swipe made prior to 2004
MB	138	1990	Tracer	33 - 89 (0.55 - 1.48)	Yes	
MB	190	2004	Tracer/ S Source	0 - 22 (0 - 0.37)	Yes	
MB	228	1990	Tracer/ S Source	0 - 25 (0 - 0.42)	Yes	
MB	246	2004	Tracer/ S Source	0	Yes	
MB	256	2001	Tracer/ S Source	0 - 27 (0 - 0.45)	Yes	
MB	258	1999	Tracer/ S Source	0	Yes	
MB	262*	1986	Tracer	0	Yes	*Swipe made prior to 2004
MB	266	1996	Tracer/ S Source	0	Yes	
MB	270	1996	Tracer/ S Source	0 - 41 (0 - 0.68)	Yes	
MB	284	1996	Tracer/ S Source	0	Yes	

Summary of EPA-WED
HVAC/Mechanical Contamination Surveys

Bld	Room	Last Use	Form (Tracer or Sealed Source)	Removable Contamination Survey Range dpm/100 cm^2 (Bq/100 $cm^{2)}$	Meets Decommission Criteria for H^3, C^{14},P^{32},S^{53},Ni^{63}, and Rb^{86} (Yes/No)	Notes
NEW	L108	2004	Tracer/ S Source	0	Yes	
NEW	L123	pre-1994	Tracer	0	Yes	
NEW	S118	pre-1994	Tracer	0	Yes	
NEW	Waste	2004	Tracer	0	Yes	
PEB/WLD	115/118*	1988	Tracer	0 - 138 (0 - 2.3)	Yes	*Swipe made prior to 2004
TERF	105	1983	Sealed Source	0 - 3 (0 - 0.05)	Yes	
TERF	113	1993	Tracer	0 - 22 0 - 0.37	Yes	
WRS	10	1986	Tracer/ S Source	13 (0 - 0.22)	Yes	
WRS	11	1992	Tracer/ S Source	0 - 19 (0 - 0.32)	Yes	
WRS	12	1986	Tracer/ S Source	0 - 21 (0 0.83)	Yes	

EPA WED Isotopes, Locations, and Quantities

Year	Room	Form	Isotope	Stored mCi	Used mCi
2004	MB 190	Tracer	C-14	10.245	0.000
			H-3	1.217	0.000
			Ni-63	0.040	0.000
		Sealed Sources	Ni-63	60.000	NA
		Check Sources	Assorted*	0.001	NA
	L108	Tracer	C-14	2.795	0.000
			H-3	1.026	0.000
	TERA	Sealed Sources	H-3	200.000	NA
2003	MB 190	Tracer	C-14	7.706	0.000
			H-3	0.251	0.000
			Ni-63	0.040	0.000
		Sealed Sources	Ni-63	60.000	NA
		Check Sources	Assorted*	0.001	NA
	L108	Tracer	C-14	2.795	0.000
			H-3	1.026	0.000
			S-35	1.258	1.258
	TERA	Sealed Sources	H-3	200.000	NA
	Waste Store (CEB)	Tracer	C-14	0.225	0.000
2002	MB 190	Tracer	C-14	7.706	0.000
			H-3	0.251	0.000
			Ni-63	0.040	0.000
		Sealed Sources	Ni-63	45.000	NA
		Check Sources	Assorted*	0.001	NA
	MB 270	Sealed Sources	Ni-63	15.000	NA
	L108	Tracer	C-14	2.795	0.000
			H-3	1.026	0.000
	TERA	Sealed Sources	H-3	200.000	NA
	Waste Store (CEB)	Tracer	C-14	0.225	0.000
2001	MB 190	Tracer	C-14	7.706	0.000
			H-3	0.251	0.000
			Ni-63	0.040	0.000
		Check Sources	Assorted*	0.001	NA
		Sealed Sources	Ni-63	30.000	NA
	MB 256	Sealed Sources	Ni-63	15.000	NA
	MB 270	Sealed Sources	Ni-63	15.000	NA
	L108	Tracer	C-14	2.795	0.000
			H-3	1.026	0.000
	TERA	Sealed Sources	H-3	200.000	NA
	Waste Store (CEB)	Tracer	C-14	0.225	0.000
2000	MB 190	Tracer	H-3	5.225	0.000
			Ni-63	0.053	0.000
			C-14	12.333	0.000
		Check Sources	Assorted*	0.001	NA
		Sealed Sources	Ni-63		NA
	MB 232	Sealed Sources	Ni-63	15.000	NA
	MB 256	Sealed Sources	Ni-63	15.000	NA
	MB 258	Sealed Sources	Ni-63	15.000	NA
	MB 270	Sealed Sources	Ni-63	15.000	NA
	L108	Tracer	C-14	8.084	0.000
			H-3	6.026	0.000
	TERA	Sealed Sources	H-3	200.000	NA

EPA WED Isotopes, Locations, and Quantities

Year	Room	Form	Isotope	Stored mCi	Used mCi
	Waste Store (CEB)	Tracer	C-14	0.225	0.000
1999	MB 190	Tracer	C-14	7.231	0.000
			H-3	0.225	0.000
			Ni-63	0.053	0.000
		Check Sources	Assorted*	0.001	NA
		Sealed Sources	Ni-63	15.000	NA
	MB 232	Sealed Sources	Ni-63	15.000	NA
	MB 256	Sealed Sources	Ni-63	15.000	NA
	MB 258	Sealed Sources	Ni-63	15.000	NA
	MB 270	Sealed Sources	Ni-63	15.000	NA
	L108	Tracer	C-14	8.084	0.000
			H-3	6.026	0.000
	TERA	Sealed Sources	H-3	200.000	NA
	Waste Store (CEB)	Tracer	C-14	0.225	0.000
1998	MB 190	Tracer	C-14	7.252	0.000
			H-3	0.251	0.000
			Ni-63	0.053	0.000
		Check Sources	Assorted*	0.001	NA
		Sealed Sources	Am-243:Be	10.000	NA
	MB 232	Sealed Sources	Ni-63	15.000	NA
	MB 256	Sealed Sources	Ni-63	15.000	NA
	MB 270	Sealed Sources	Ni-63	15.000	NA
	L108	Tracer	C-14	8.084	0.000
			H-3	6.026	0.000
	TERA	Sealed Sources	H-3	200.000	NA
	Waste Store (CEB)	Tracer	C-14	0.225	0.000
1997	MB 190	Tracer	C-14	7.498	0.000
			H-3	0.282	0.000
			Ni-63	0.053	0.000
		Sealed Sources	Am-243:Be	10.000	NA
		Check Sources	Assorted*	0.001	NA
	MB 232	Sealed Sources	Ni-63	15.000	NA
	MB 256	Sealed Sources	Ni-63	15.000	NA
	MB 270	Sealed Sources	Ni-63	15.000	NA
	L106	Sealed Sources	Ni-63	15.000	NA
	L108	Tracer	C-14	8.084	0.000
			H-3	6.026	0.000
	TERA	Sealed Sources	H-3	200.000	NA
	Waste Store (CEB)	Tracer	C-14	0.225	0.000
1996	MB 190	Tracer	C-14	8.810	0.000
			H-3	3.714	0.000
			Ni-63	0.053	0.000
		Sealed Sources	Ni-63	60.500	NA
		Sealed Sources	Am-243:Be	10.000	NA
		Check Sources	Assorted*	0.001	NA
	MB 232	Sealed Sources	Ni-63	15.000	NA
	MB 236	Tracer	C-14	3.645	0.000
	MB 258	Sealed Sources	Ni-63	15.000	NA
	MB 270	Tracer	C-14	0.005	0.000
	MB 282	Sealed Sources	Ni-63	15.000	NA
	MB 284	Sealed Sources	Ni-63	29.500	NA

EPA WED Isotopes, Locations, and Quantities

Year	Room	Form	Isotope	Stored mCi	Used mCi
	L106	Sealed Sources	Ni-63	15.000	NA
	L108	Tracer	C-14	8.084	0.000
			H-3	6.026	0.000
	TERA	Sealed Sources	H-3	200.000	NA
	Waste Store (CEB)	Tracer	C-14	0.225	0.000
1995	MB 134/270	Tracer	C-14	0.248	0.002
	MB 190	Tracer	C-14	21.310	0.000
			H-3	3.714	0.000
			Ni-63	0.053	0.000
		Sealed Sources	Ni-63	60.500	NA
		Sealed Sources	Am-243:Be	10.000	NA
		Check Sources	Assorted*	0.001	NA
	MB 232	Sealed Sources	Ni-63	15.000	NA
	MB 236	Tracer	C-14	4.865	0.600
	MB 258	Sealed Sources	Ni-63	15.000	NA
	MB 270	Tracer	C-14	0.636	0.004
	MB 282	Sealed Sources	Ni-63	15.000	NA
	MB 284	Sealed Sources	Ni-63	29.500	NA
	L106	Sealed Sources	Ni-63	15.000	NA
	L108	Tracer	C-14	8.084	NA
			H-3	5.026	NA
	Waste Store (CEB)	Tracer	C-14	0.225	NA
1994	MB 190	Tracer	C-14	19.342	0.000
			H-3	5.657	0.000
			Ni-63	0.053	0.000
		Sealed Sources	Ni-63	43.000	NA
		Sealed Sources	Am-243:Be	10.000	NA
		Check Sources	Assorted*	0.001	NA
	MB 204	Sealed Sources	Ni-63	15.000	NA
	MB 232	Sealed Sources	Ni-63	15.000	NA
	MB 236	Tracer	C-14	4.865	0.240
	MB 246	Sealed Sources	Ni-63	15.000	NA
	MB 258	Sealed Sources	Ni-63	15.000	NA
	MB 270	Tracer	C-14	0.636	0.000
	MB 284	Sealed Sources	Ni-63	29.500	NA
	MB 290	Sealed Sources	Ni-63	8.000	NA
1993	MB 190	Tracer	C-14	19.953	0.000
			H-3	5.657	0.000
			Ni-63	0.053	0.000
		Sealed Sources	Ni-63	23.000	NA
			Ru-106	0.001	NA
			Tl-204	0.001	NA
			Sr-90	0.004	NA
			Pb-210	0.006	NA
			Am-243:Be	10.000	NA
		Check Sources	Assorted*	0.001	NA
	MB 204	Sealed Sources	Ni-63	15.000	NA
	MB 232	Sealed Sources	Ni-63	15.000	NA
	MB 236	Tracer	H-3	0.384	0.000
			C-14	0.367	0.000
	MB 246	Sealed Sources	Ni-63	15.000	NA

EPA WED Isotopes, Locations, and Quantities

Year	Room	Form	Isotope	Stored mCi	Used mCi
	MB 258	Sealed Sources	Ni-63	15.000	NA
	MB 270	Sealed Sources	Ni-63	8.000	NA
	MB 270/266	Tracer	C-14	0.499	0.136
	MB 284	Sealed Sources	Ni-63	29.500	NA
	TERF HB	Tracer	H-3	29.500	0.050
1992	MB 130	Tracer	H-3	0.198	1.401
			Cr-51	0.100	0.500
	MB 190	Tracer	C-14	19.175	0.000
			H-3	6.474	0.000
			C-51	1.000	0.000
			P-32	0.250	0.000
			Ni-63	48.000	NA
			Ru-106	0.001	NA
			Tl-204	0.001	NA
			Sr-90	0.004	NA
			Pb-210	0.006	NA
			Am-243:Be	10.000	NA
		Check Sources	Assorted*	0.001	NA
	MB 204	Sealed Sources	Ni-63	15.000	NA
	MB 232	Sealed Sources	Ni-63	15.000	NA
	MB 236	Tracer	H-3	0.384	0.000
			C-14	0.367	0.000
	MB 246	Sealed Sources	Ni-63	15.000	NA
	MB 256/258	Sealed Sources	Ni-63	15.000	NA
		Tracer	C-14	3.228	0.000
			H-3	0.016	0.000
	MB 266/270	Sealed Sources	Ni-63	8.000	NA
		Tracer	C-14	0.506	0.506
	MB 284	Sealed Sources	Ni-63	44.000	NA
	MB 290	Sealed Sources	Ni-63	15.000	NA
	WRS 11	Tracer	P-32	0.256	0.000
1991	MB 130	Tracer	Cr-51	1.000	3.000
			H-3	1.280	1.995
	MB 190	Tracer	C-14	15.855	0.000
			H-3	12.115	0.000
			Cr-51	1.000	0.000
			Ni-63	0.056	0.000
			P-32	0.250	0.000
			S-35	0.250	0.000
		Sealed Sources	Ru-106	0.001	NA
			Tl-204	0.001	NA
			Sr-90	0.004	NA
			Ni-63	48.000	NA
			Pb-210	0.006	NA
			Am-243:Be	10.000	NA
		Check Sources	Assorted*	0.001	NA
	MB 232	Sealed Sources	Ni-63	15.000	NA
	MB 236	Tracer	C-14	0.367	0.000
		Tracer	H-3	0.384	0.000
	MB 246	Sealed Sources	Ni-63	15.000	NA
			C-14	0.421	0.000

EPA WED Isotopes, Locations, and Quantities

Year	Room	Form	Isotope	Stored mCi	Used mCi
	MB 256/258	Tracer	C-14	2.808	0.000
			H-3	0.016	0.000
	MB 284	Sealed Sources	Ni-63	44.000	NA
	MB 290	Sealed Sources	Ni-63	23.000	NA
	WRS 11	Tracer	P-32	0.143	0.000
1990	MB 130	Tracer	Cr-51	2.205	5.430
			H-3	5.341	1.445
	MB 190	Tracer	C-14	15.854	0.000
			Cr-51	0.290	0.000
			S-35	0.280	0.000
			H-3	1.113	0.000
			Ni-63	0.056	0.000
		Sealed Sources	Ru-106	0.001	NA
			Tl-204	0.001	NA
			Sr-90	0.004	NA
			Pb-210	0.006	NA
			Ni-63	48.000	NA
		Check Sources	Assorted*	0.001	NA
	MB 232	Sealed Sources	Ni-63	15.000	NA
	MB 236	Tracer	C-14	0.367	0.000
			H-3	0.784	0.416
	MB 246	Sealed Sources	Ni-63	15.000	NA
	MB 258/256	Tracer	C-14	3.230	0.008
			H-3	0.017	0.000
			P-32	0.308	0.000
	MB 284	Sealed Sources	Ni-63	44.000	NA
	MB 290	Sealed Sources	Ni-63	23.000	NA
	MB 292/294	Tracer	S-35	1.248	1.700
	TERF HB	Tracer	C-14	0.000	0.950
1989	Annex	Sealed Sources	Ni-63	15.000	NA
	MB 130	Tracer	Cr-51	5.360	2.900
			H-3	5.228	0.092
	MB 190	Tracer	C-14	15.856	0.000
			H-3	1.901	0.000
			Ni-63	0.056	0.000
			P-32	0.250	0.000
			S-35	1.000	0.000
			Cr-51	0.250	0.000
		Check Sources	Assorted*	0.001	NA
		Sealed Sources	Ni-63	33.000	NA
	MB 228	Sealed Sources	Ni-63	30.000	NA
	MB 236	Tracer	C-14	0.391	0.000
			H-3	1.085	1.744
	MB 246	Sealed Sources	Ni-63	15.000	NA
	MB 256/258	Tracer	C-14	3.232	0.006
			H-3	0.018	0.000
	MB 270	Tracer	P-32	0.240	0.063
	MB 284	Sealed Sources	Ni-63	44.000	NA
	MB 290	Sealed Sources	Ni-63	8.000	NA
	MB 292/294	Tracer	S-35	1.058	1.058

EPA WED Isotopes, Locations, and Quantities

Year	Room	Form	Isotope	Stored mCi	Used mCi
	TERF HB	Tracer	C-14	0.000	1.700
1988	Annex	Sealed Sources	Ni-63	15.000	NA
	MB 130	Tracer	H-3	16.977	16.970
		Sealed Sources	Ni-63	15.000	NA
	MB 132	Sealed Sources	Ni-63	8.000	NA
	MB 190	Tracer	C-14	16.354	0.000
			H-3	1.142	0.000
			Ni-63	0.059	0.007
			P-32	0.250	0.000
		Sealed Sources	Ni-63	18.000	NA
		Check Sources	Assorted*	0.001	NA
	MB 228	Sealed Sources	Ni-63	30.000	NA
	MB 256/258	Tracer	C-14	2.912	1.292
			H-3	1.063	0.867
	MB 270	Tracer	P-32	0.160	0.160
	MB 284	Sealed Sources	Ni-63	44.000	NA
	TERF 113	Tracer	C-14	0.000	0.500
	WILD 115/118	Tracer	H-3	0.000	16.970
1987	Annex	Sealed Sources	Ni-63	15.000	NA
	MB 130	Sealed Sources	Ni-63	15.000	NA
	MB 132	Sealed Sources	Ni-63	8.000	NA
	MB 134	Sealed Sources	Ni-63	0.000	NA
	MB 190	Tracer	C-14	16.536	0.000
			H-3	9.558	0.000
			N-63	0.059	0.000
			Rb-86	1.000	0.000
			P-32	0.250	0.000
		Sealed Sources	Ni-63	18.000	NA
		Check Sources	Assorted*	0.001	NA
	MB 228	Sealed Sources	Ni-63	30.000	NA
	MB 232	Sealed Sources	Ni-63	0.000	NA
	MB 256/258	Tracer	C-14	4.819	1.082
	MB 266	Tracer	P-32	1.500	1.205
	MB 284	Sealed Sources	Ni-63	44.000	NA
	TERF 113	Tracer	C-14	0.000	0.500
			Rb-86	0.000	0.630
1986	MB 130	Sealed Sources	Ni-63	15.000	NA
	MB 132	Sealed Sources	Ni-63	8.000	NA
	MB 134	Sealed Sources	Ni-63	15.000	NA
	MB 190	Tracer	P-32	0.250	0.000
			C-14	18.082	0.000
			H-3	0.018	0.000
			H-3	1.366	0.000
			N--63	0.059	0.000
			Rb-86	0.316	0.000
			Ni-63	0.059	0.000
		Sealed Sources	Ni-63	18.000	NA
		Check Sources	Assorted*	0.001	NA
	MB 228	Tracer	H-3	0.001	0.000
	MB 232	Sealed Sources	Ni-63	30.000	NA
	MB 258	Tracer	C-14	10.932	0.939

EPA WED Isotopes, Locations, and Quantities

Year	Room	Form	Isotope	Stored mCi	Used mCi
	MB 270	Tracer	P-32	0.250	0.510
	MB 284	Sealed Sources	Ni-63	44.000	NA
	TERF 113	Tracer	Rb-86	0.000	0.990
			C-14	0.000	0.500
1985	MB 130	Sealed Sources	Ni-63	15.000	NA
	MB 132	Sealed Sources	Ni-63	8.000	NA
	MB 190		C-14	18.647	0.000
			H-3	0.024	0.003
			Ni-63	0.059	0.000
			P-32	0.250	0.000
		Sealed Sources	Ni-63	52.000	NA
		Check Sources	Assorted*	0.001	NA
	MB 228	Tracer	H-3	0.005	0.000
		Sealed Sources	Ni-63	15.000	NA
	MB 232	Sealed Sources	Ni-63	25.000	NA
	MB 256/258	Tracer	C-14	3.506	0.708
	MB 266/270	Tracer	P-32	0.250	0.000
	MB 284	Sealed Sources	Ni-63	44.000	NA
	TERF 113	Tracer	C-14		0.500
1984**	**MB 126,129 130,131,132,133,134,149,150,190,226, 228,236,248,250,256,258,266,270,282, TERF 113, WFTS 10, 11, 112, 44	Tracers and Sealed Sources	H-3 sources, C-14 tracers, Ni-63 sources	See Note	See Note
	MB 130	Sealed Sources	Ni-63	15.000	NA
	MB 132	Sealed Sources	Ni-63	8.000	NA
	MB 190	Sealed Sources	Ni-63	52.000	NA
		Check Sources	Assorted*	0.001	NA
	MB 228	Sealed Sources	Ni-63	15.000	NA
	MB 232	Sealed Sources	Ni-63	10.000	NA
	MB 284	Sealed Sources	Ni-63	29.000	NA
	TERF 113	Tracers			
1983**	**	Tracers	See Note	See Note	See Note
	MB 190	Sealed Sources	Ni-63	53.000	NA
		Check Sources	Assorted*	0.001	NA
	MB 228	Sealed Sources	Ni-63	38.000	NA
	MB 284	Sealed Sources	Ni-63	30.000	NA
	TERF 105	Sealed Sources	Ni-63	10.000	NA
	TERF 113				
1982**	**	Tracers	See Note	See Note	See Note
	MB 190	Sealed Sources	Ni-63	53.000	NA
		Check Sources	Assorted*	0.001	NA
	MB 228	Sealed Sources	Ni-63	38.000	NA
	MB 284	Sealed Sources	Ni-63	30.000	NA
	TERF 105	Sealed Sources	Ni-63	10.000	NA
	**	Tracers	See Note	See Note	See Note
	MB 150	Sealed Sources	H-3/Sc	250.000	NA

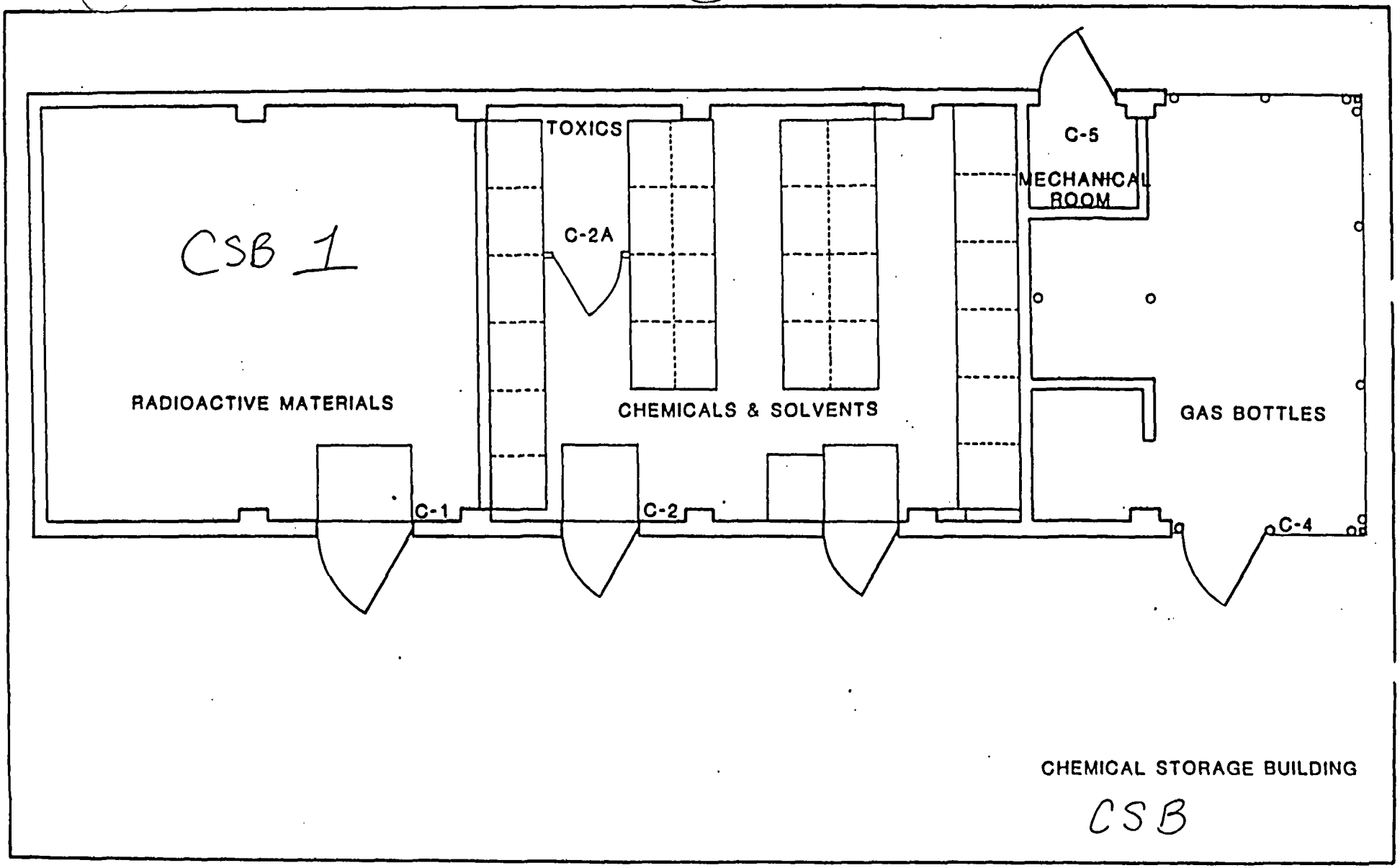
EPA WED Isotopes, Locations, and Quantities

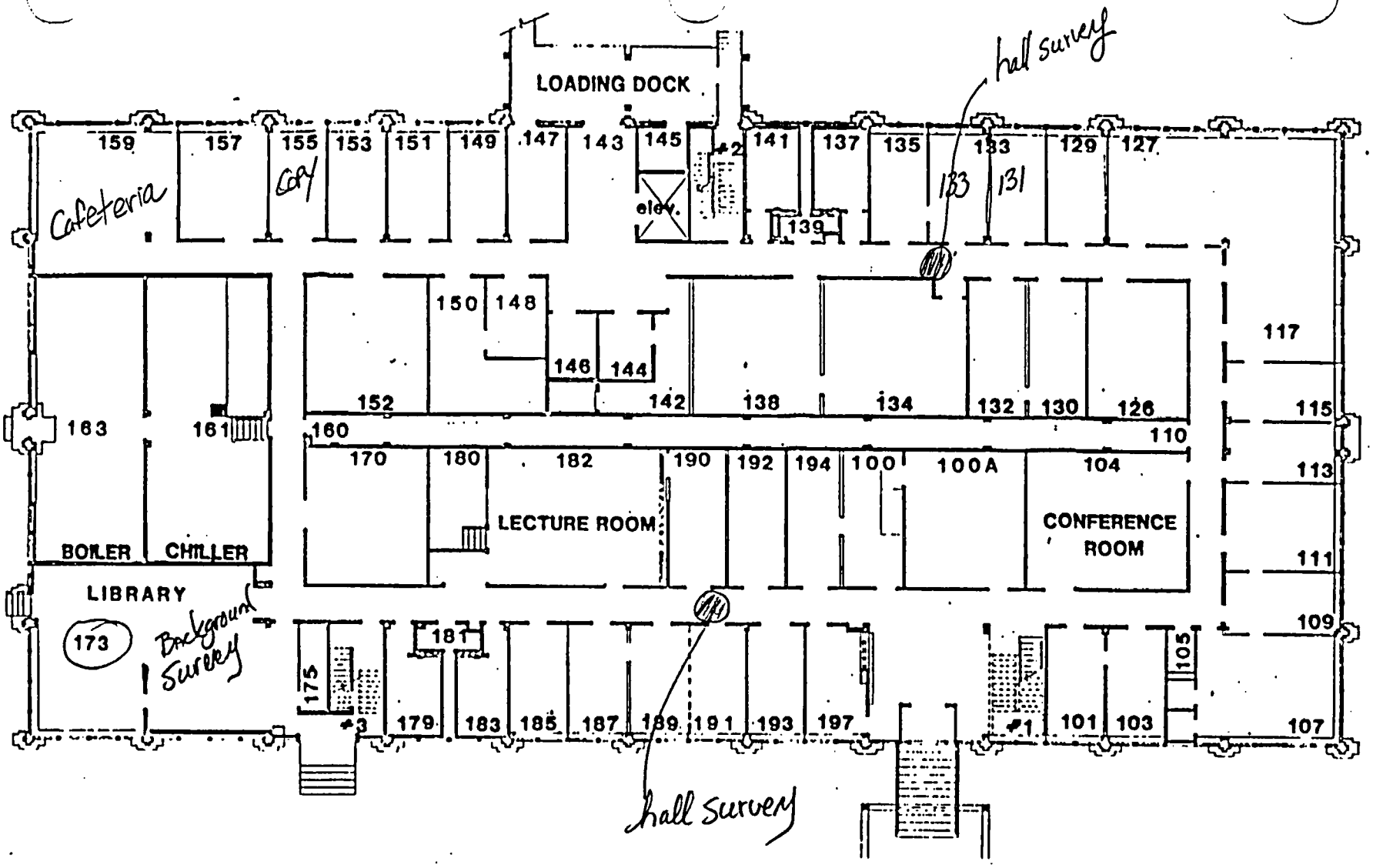
Year	Room	Form	Isotope	Stored mCi	Used mCi
1981**	MB 190	Sealed Sources	Ni-63	8.000	NA
		Check Sources	Assorted*	0.001	NA
	MB 228	Sealed Sources	Ni-63	8.000	NA
	MB 266	Sealed Sources	Ni-63	29.000	NA
	MB 284	Sealed Sources	Ni-63	29.000	NA
	TERF 105	Sealed Sources	Ni-63	10.000	NA
1980**	**	Tracers	See Note	See Note	See Note
	MB 130	Sealed Sources	H-3/Sc	2000.000	NA
	MB 190	Sealed Sources	Ni-63	30.000	NA
		Check Sources	Assorted*	0.001	NA
	WFTS	Sealed Sources	Ni-63	58.000	NA
1979**	**	Tracers	See Note	See Note	See Note
	MB/WFTS	Sealed Sources	H-3/Sc	3500.000	NA
		Sealed Sources	Ni-63	30.000	NA
	MB 190	Check Sources	Assorted*	0.001	NA
1978**	**	Tracers	See Note	See Note	See Note
	MB 130	Sealed Sources	H-3/Sc	2000.000	NA
	MB 190	Sealed Sources	H-3/Sc	2000.000	NA
		Check Sources	Assorted*	0.001	NA
	MB 266	Sealed Sources	H-3/Sc	4000.000	NA
			Ni-63	29.000	NA
	MB 270	Sealed Sources	Ni-63	14.500	NA
	TERF 105	Sealed Sources	Ni-63	10.000	NA
	WFTS	Sealed Sources	Ni-63	14.500	NA
1977**		Tracers	See Note	See Note	See Note
	MB 190	Sealed Sources	Ni-63	43.500	NA
		Sealed Sources	H-3/Sc	7000.000	NA
		Check Sources	Assorted*	0.001	NA
	MB 228	Sealed Sources	Ni-63	29.000	NA
			H-3/Sc	2000.000	NA
	MB 270	Sealed Sources	Ni-63	14.500	NA
	WFTS	Sealed Sources	Ni-63	15.000	NA
1976**		Tracers	See Note	See Note	See Note
	MB 130	Sealed Sources	H-3/Sc	1000.000	NA
	MB 190	Check Sources	Assorted*	0.001	NA
	MB 284	Sealed Sources	H-3/Sc	6000.000	NA
			Ni-63	29.000	NA
	WFTS	Sealed Sources	Ni-63	15.000	NA

EPA WED Isotopes, Locations, and Quantities

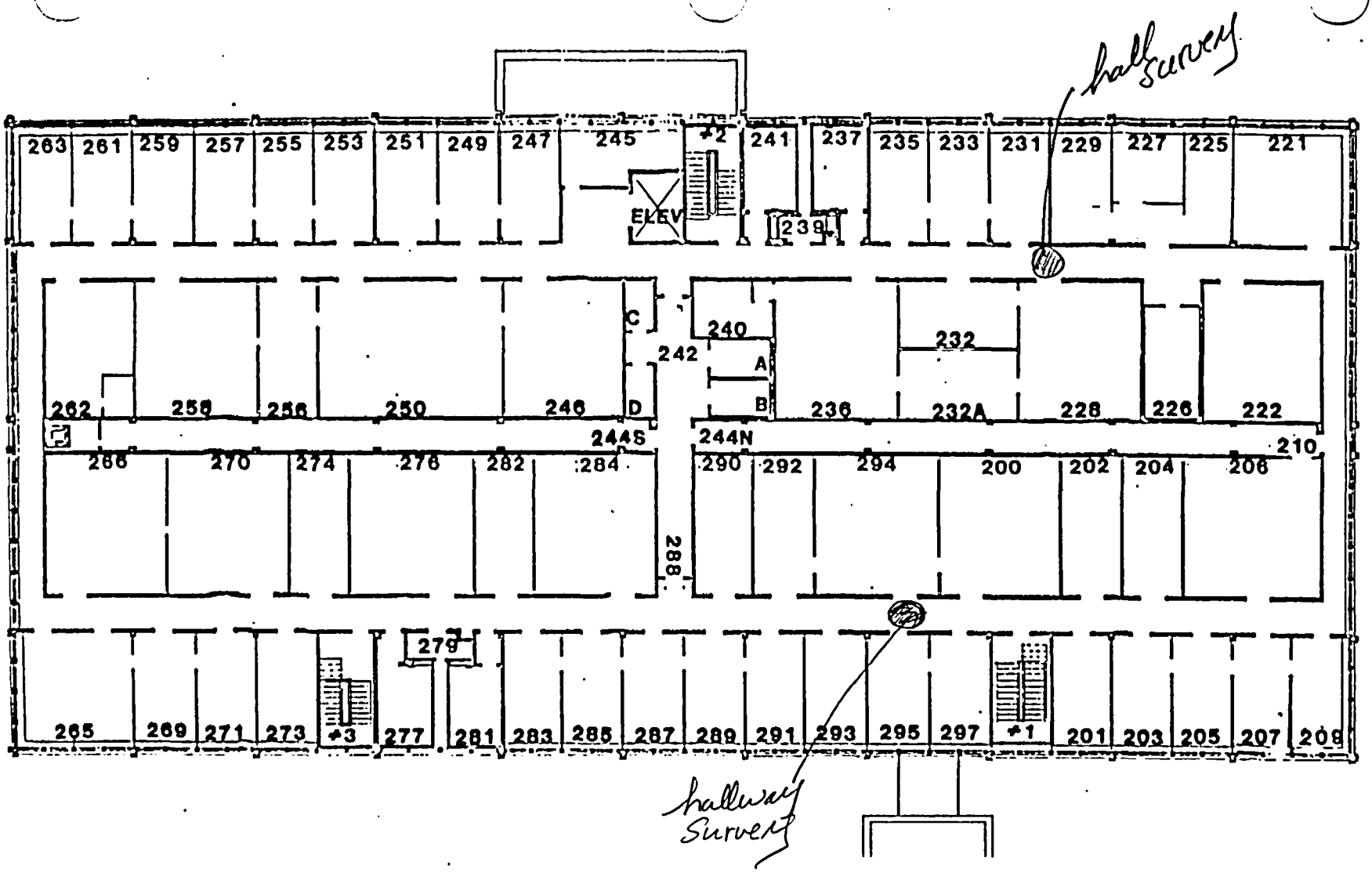
Cell: A389
Comment: *Assorted= Solid form. Assorted instrument check sources, standards, and anti-static devices of 0.1 - 1.0 uCi (H-3, C-14, Co-60, Ni-63,Cs-137, Ra-226, Am-243)

Cell: D389
Comment: **YEAR = Isotopes (H-3 sources, C-14 tracers, and Ni-63 sources) were used in MB 136, 130, 131, 132, 133, 134, 150, 190, 228, 236, 250, 256, 254, 266, 270, 282, TERF 113, and WFTS 10, 11, 12, 44 prior to 1985.

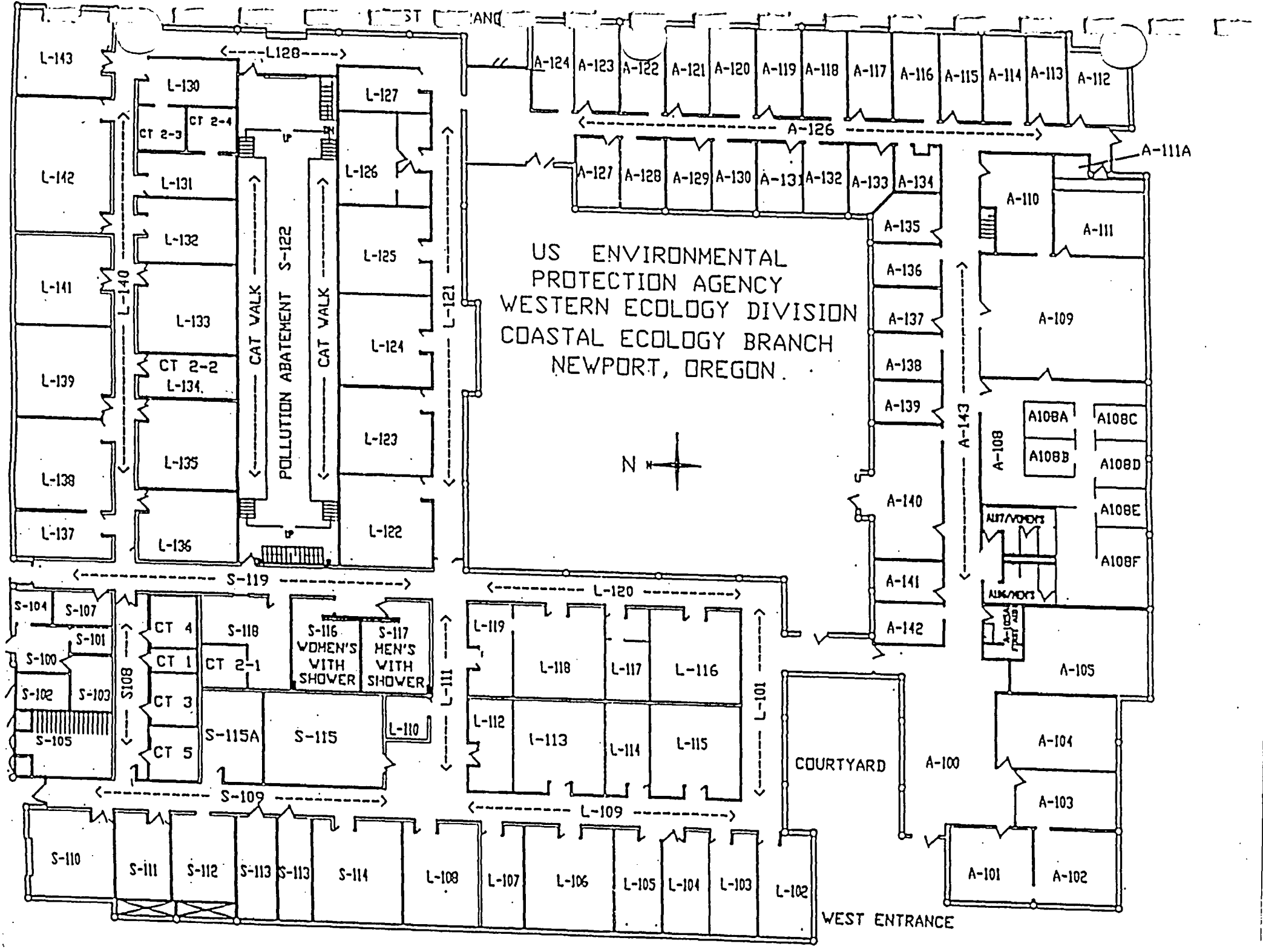

CSB 1
TOXICS
C-2A
C-5
MECHANICAL ROOM
RADIOACTIVE MATERIALS
CHEMICALS & SOLVENTS
GAS BOTTLES
C-1
C-2
C-4
CHEMICAL STORAGE BUILDING
CSB



MAIN BUILDING, FIRST FLOOR



MAIN BUILDING, SECOND FLOOR


US ENVIRONMENTAL
PROTECTION AGENCY
WESTERN ECOLOGY DIVISION
COASTAL ECOLOGY BRANCH
NEWPORT, OREGON
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L-130
CT 2-3
CT 2-4
L-142
L-131
L-132
L-141
L-133
L-140
CT 2-2
L-134
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L-135
L-138
L-136
L-137
L-128
CAT VALK
POLLUTION ABATEMENT S-122
CAT VALK
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L-126
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WEST ENTRANCE
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S-109
S108
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S-107
S-101
S-100
S-102
S-103
S-105
CT 4
CT 1
CT 3
CT 5
S-118
CT 2-1
S-115A
S-115
S-116
WOMEN'S
WITH
SHOWER
S-117
MEN'S
WITH
SHOWER
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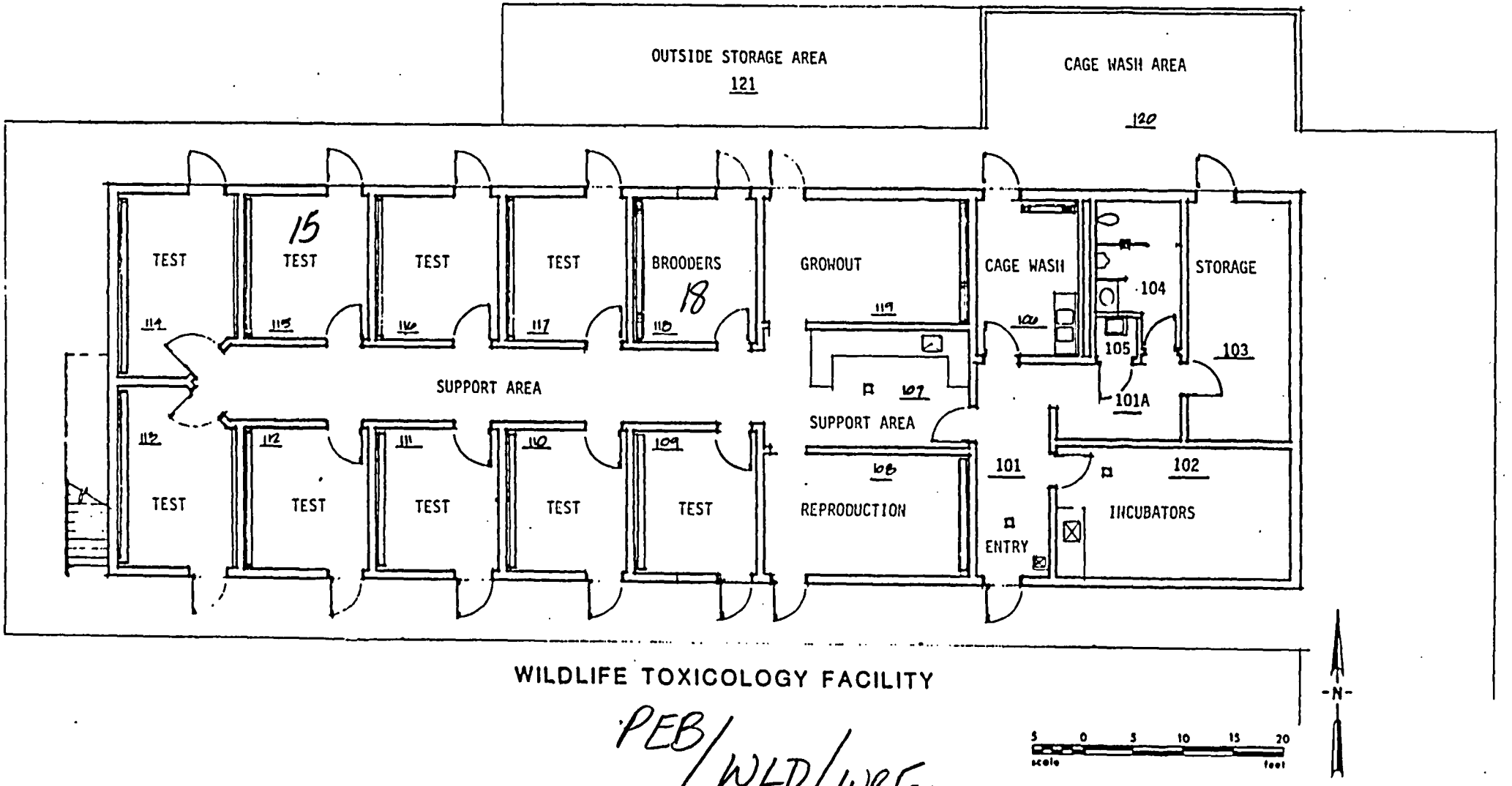
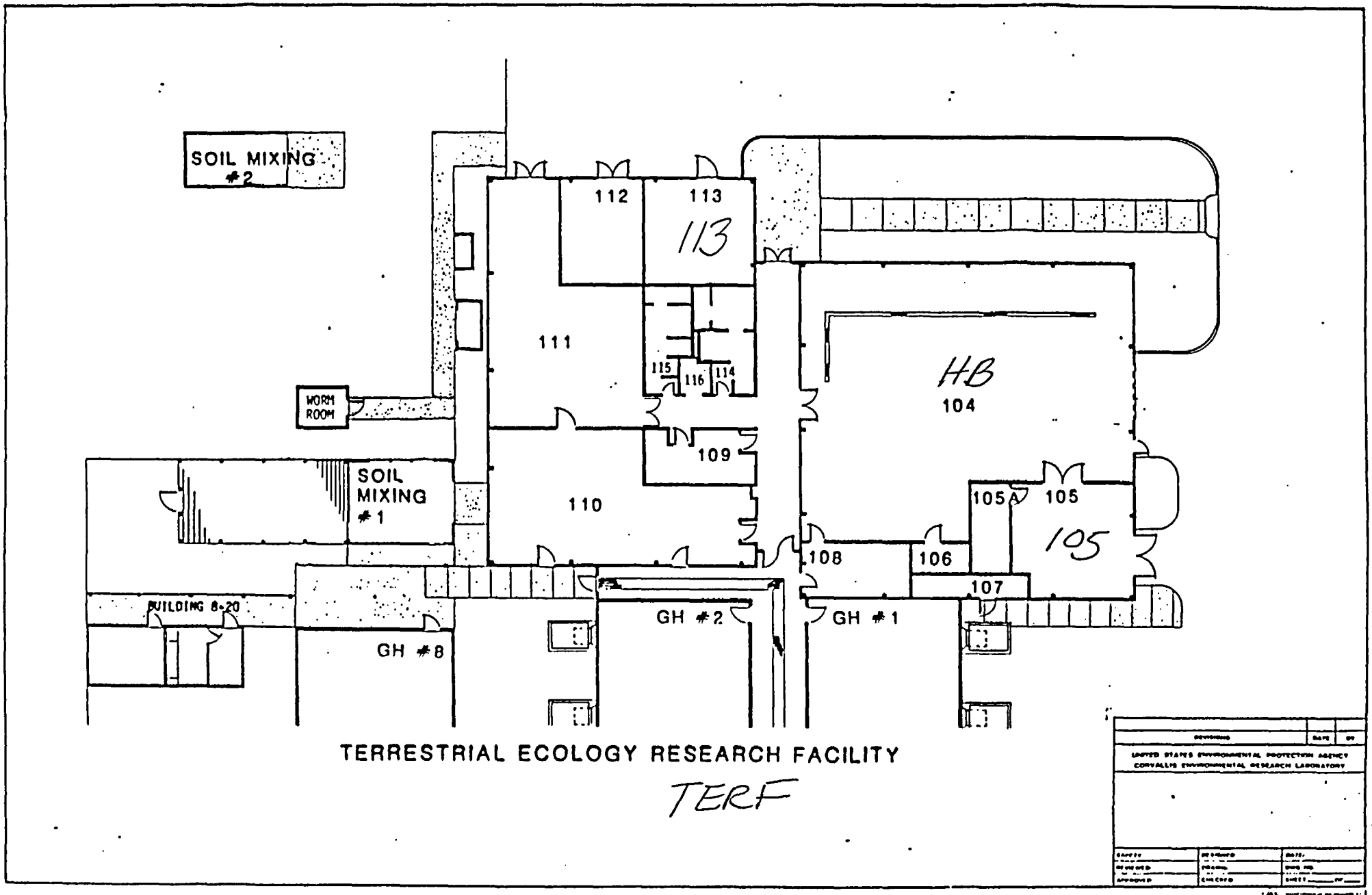
L-102



WILDLIFE TOXICOLOGY FACILITY

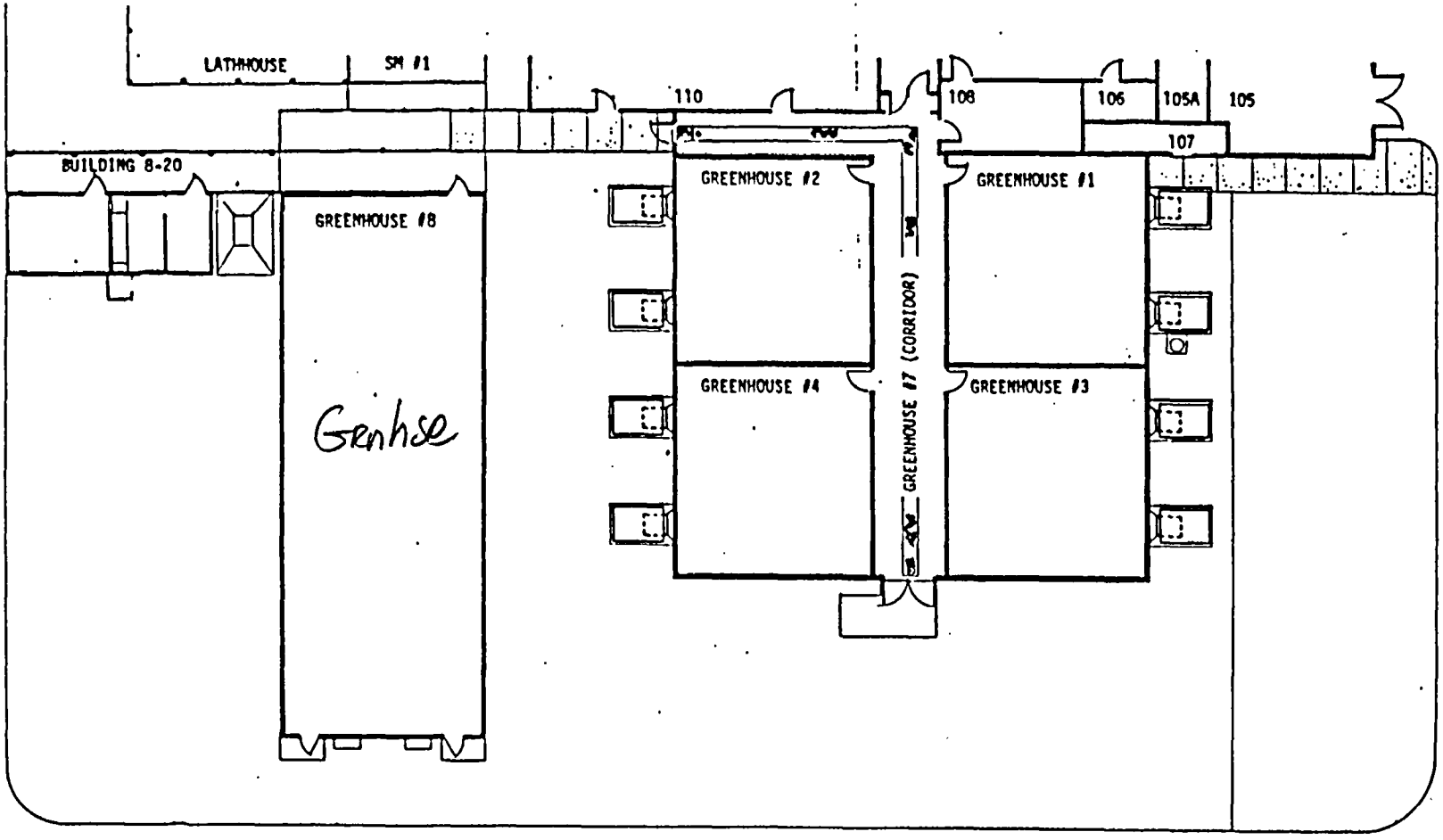
PEB/WLD/WRF



TERRESTRIAL ECOLOGY RESEARCH FACILITY

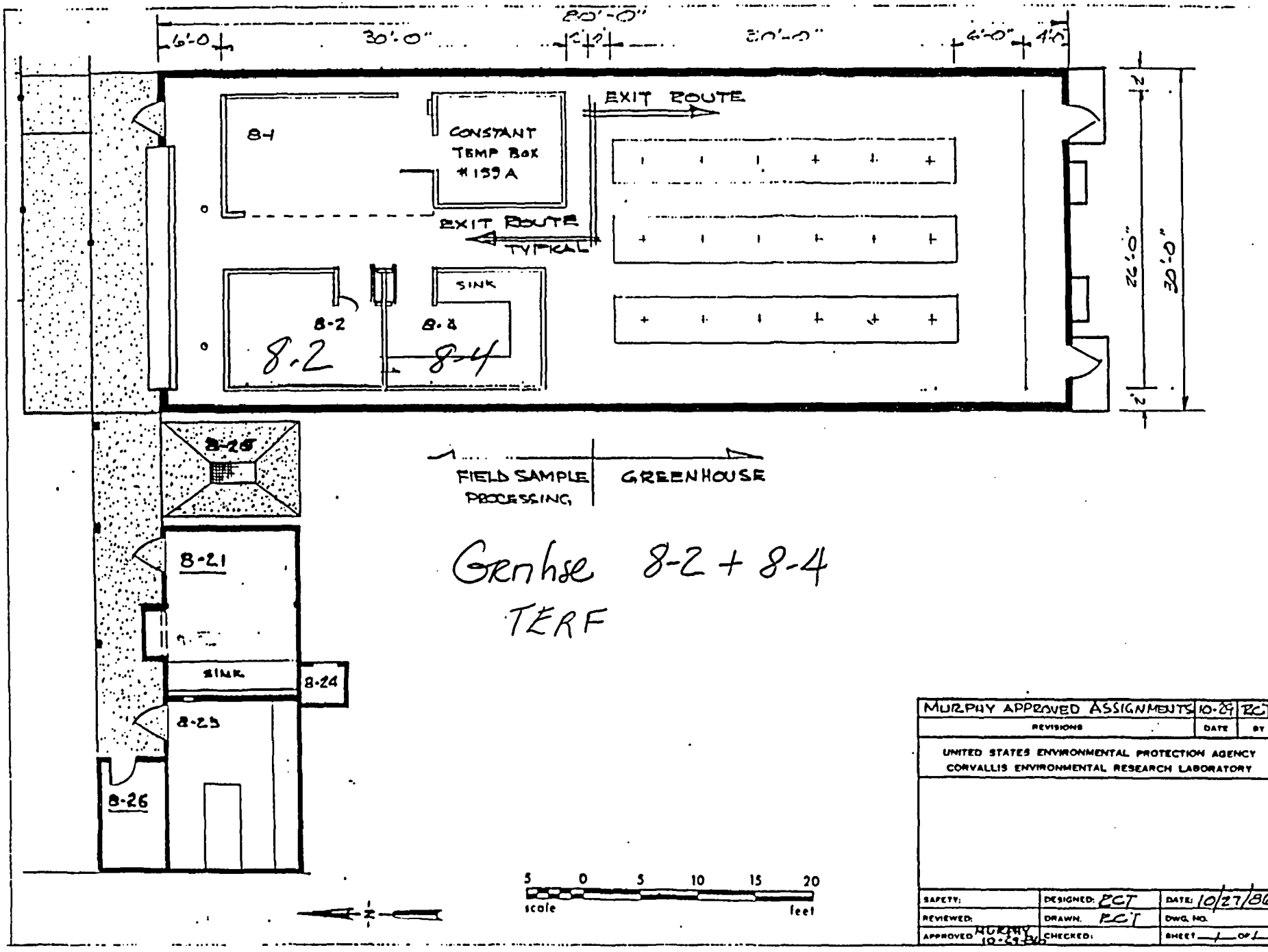
TERF

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
CORVALLIS ENVIRONMENTAL RESEARCH LABORATORY



TERRESTRIAL ECOLOGY RESEARCH FACILITY

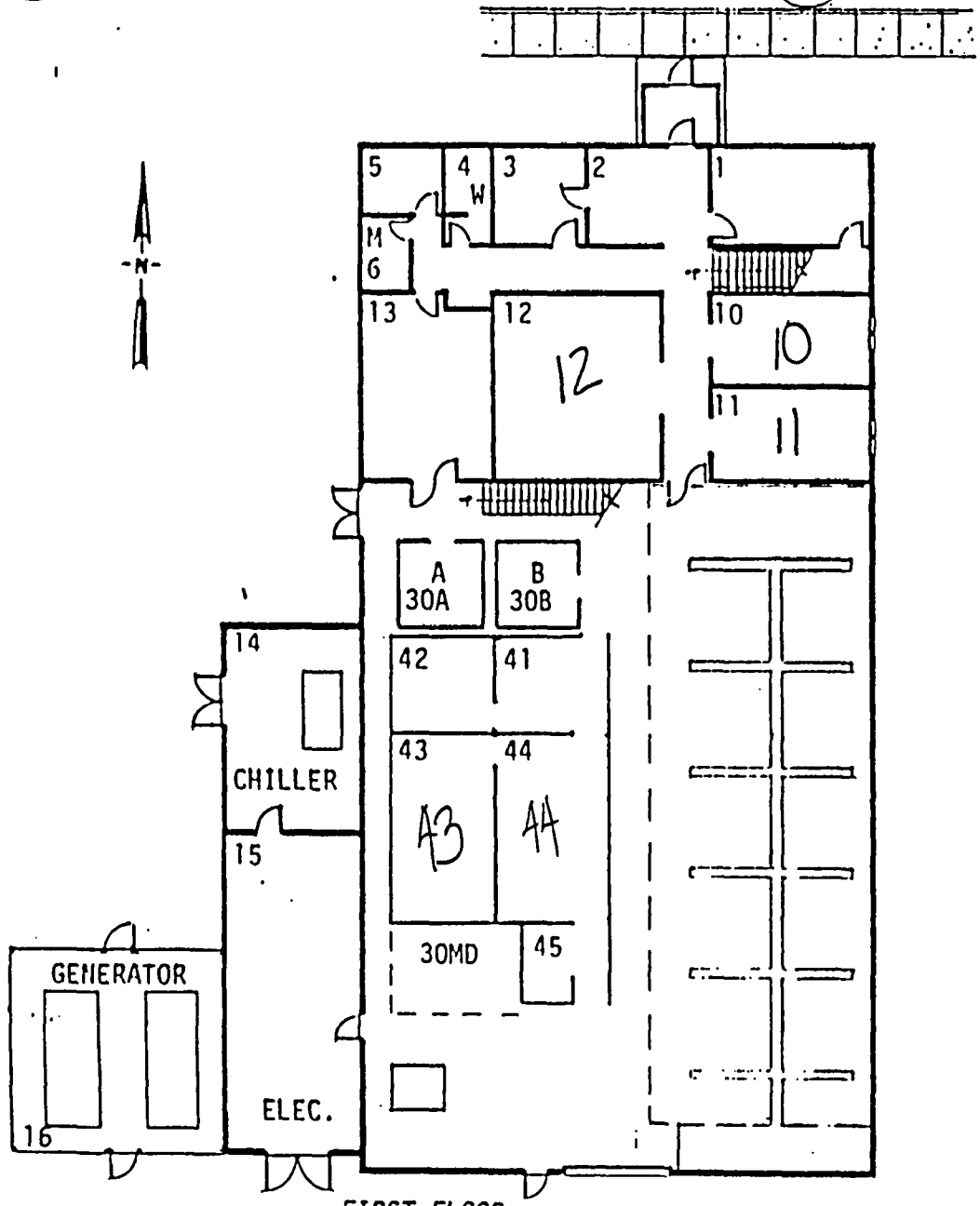
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
CORVALLIS ENVIRONMENTAL RESEARCH LABORATORY



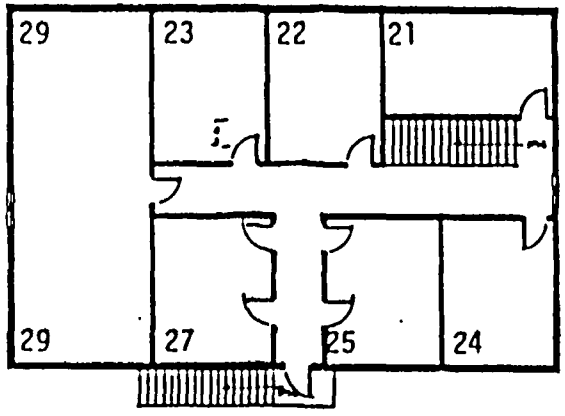
MURPHY APPROVED ASSIGNMENTS		10-27	RCT
REVISIONS		DATE	BY

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
CORVALLIS ENVIRONMENTAL RESEARCH LABORATORY

SAFETY:	DESIGNED: RCT	DATE: 10/27/86
REVIEWED:	DRAWN: RCT	DWG. NO.
APPROVED: MURPHY 10-27-86	CHECKED:	SHEET 1 OF 1



FIRST FLOOR
WFTS MAIN BUILDING



SECOND FLOOR
WFTS MAIN BUILDING

WRS

10, 11, 12, 43, 44

U.S. Environmental Protection Agency
Western Ecology Division

NRC Radioactive Materials License No. 36-12343-02 Termination and Facility Decommissioning

Date: November 27, 2004
Subject: Room Survey: Chemical Storage Building –Waste Room (CSB-1) Final Contamination Survey.

Description and Historic Use:

Separate building (450 ft^2). This is the Radiation Safety Waste Room. Waste from radioisotope tracers and sealed sources used at the Western Ecology Division were often stored and/or handled in CSB-1. There is no radioactive waste remaining in CSB-1.

Surveys:

Total (fixed + removable) and removable contamination surveys were conducted in CSB-1 in November 2004. All total contamination surveys (23 total) demonstrated no contamination. Eight swipes indicated very low levels of removable contamination from tritium (0.20 – 0.68 Bq/100 cm^2). All other sampling points were at background. This area meets the contamination criteria for unrestricted use based upon the isotopes used at our facilities. A HVAC duct swipe was made in November 2004 which detected no contamination.

Records for this room clearly demonstrate that contamination surveys were regularly performed, the area was not subject to any significant contamination events, and the room was maintained as a contaminate-free area. We determined it was unnecessary to conduct further contamination surveys in this area given these survey results and the Western Ecology Division's historic management of radioactive material use in this area. Records of the most recent historic surveys (i.e. prior to the final decommissioning surveys) of CSB-1 are included in this report.

The survey for total contamination was conducted using a Ludlum Model 2000 Scaler equipped with a Ludlum Model 44-9, 12-cm^2 thin-window Geiger-Muller pancake detector. Removable contamination was determined using methanol-wetted swipes counted in a Packard 2200 CA dual channel Liquid Scintillation Counter.

NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY

FIXED SURVEY

DATE 11-11-04 LOCATION CSB ROOM 1

INSTRUMENT Ludlum 2000 Scaler Pancake Probe 44-9

SERIAL NO. 83810 / PR070834

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
1	46	<LLD95	ND
2	48		
3	52		
4	37		
5	54		
6	50		
7	20		
8	32		
9	52		
10	50		
11	48		
12	30		
13	28		
14	46		
15	39		
16	36		
17	54		
18	40		
19	44		
20	36		
21	46		
22	52		
23	54		

$LLD_{95} = \left\{\left(\frac{\sqrt{38}}{0.5}\right) \times 2.96\right\}\% = 113$ CPM

BACKGROUND STANDARD (^{14}C 0.16 µCi) 76 CPM / 19540 CPM, 2.8% eff.

Time 0.5'

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²

$LLD_{95} = \left\{\left(\text{---------}\right) \times 2.96\right\}\% =$ CPM

BACKGROUND STANDARD ( )

COMMENTS:

D. Monaco
RADIATION SPCL.

11-16-04
DATE

NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY

DATE 11-14-04 LOCATION CSB ROOM 1

INSTRUMENT Packard LSC 2200 CA

SERIAL NO. Ø36755

3H

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
1	7	12	0.20
2	8	16	0.26
3	3	LLD95	ND
4	3	↓	↓
5	6	↓	↓
6	9	20	0.33
7	7	15	0.25
8	8	22	0.36
9	6	LLD95	ND
10	6	↓	↓
11	5	↓	↓
12	3	↓	↓
13	4	↓	↓
14	6	↓	↓
15	6	↓	↓
16	7	12	0.20
17	14	41	0.68
18	3	LLD95	ND
19	4	↓	↓
20	4	↓	↓
21	7	24	0.40
22	5	LLD95	ND
23	4	↓	↓

$LLD_{95} = \{(\text{---------}) \times 2.96\} + = 7$ CPM

BACKGROUND STANDARD (^3H 64,179 dpm) 4 CPM = 56,056 dpm

87% eff

14C

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
	21	LLD95	ND
	17	↓	↓
	20	↓	↓
	17	↓	↓
	18	↓	↓
	23	↓	↓
	17	↓	↓
	17	↓	↓
	20	↓	↓
	24	↓	↓
	20	↓	↓
	14	↓	↓
	19	↓	↓
	18	↓	↓
	16	↓	↓
	19	↓	↓
	20	↓	↓
	16	↓	↓
	16	↓	↓
	13	↓	↓
	13	↓	↓
	17	↓	↓
	17	↓	↓

$LLD_{95} = \{(\text{---------}) \times 2.96\} + = 30$ CPM

BACKGROUND STANDARD (^{14}C 84,000 dpm) 22 CPM = 85,603 dpm

102 eff

COMMENTS:

RADIATION SPCL. [signature]

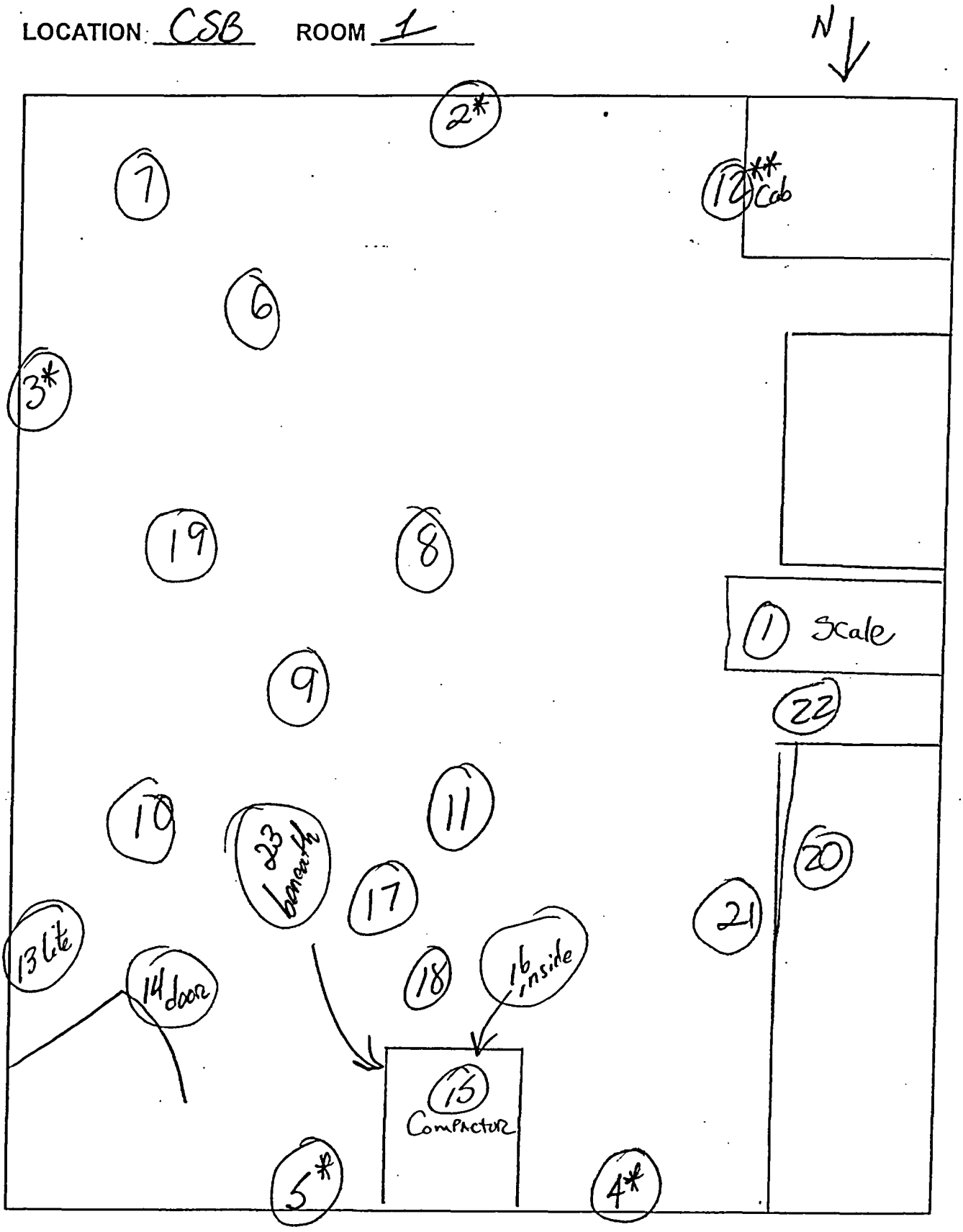
DATE 11-18-04

NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY MAP

LOCATION: CSB ROOM 1



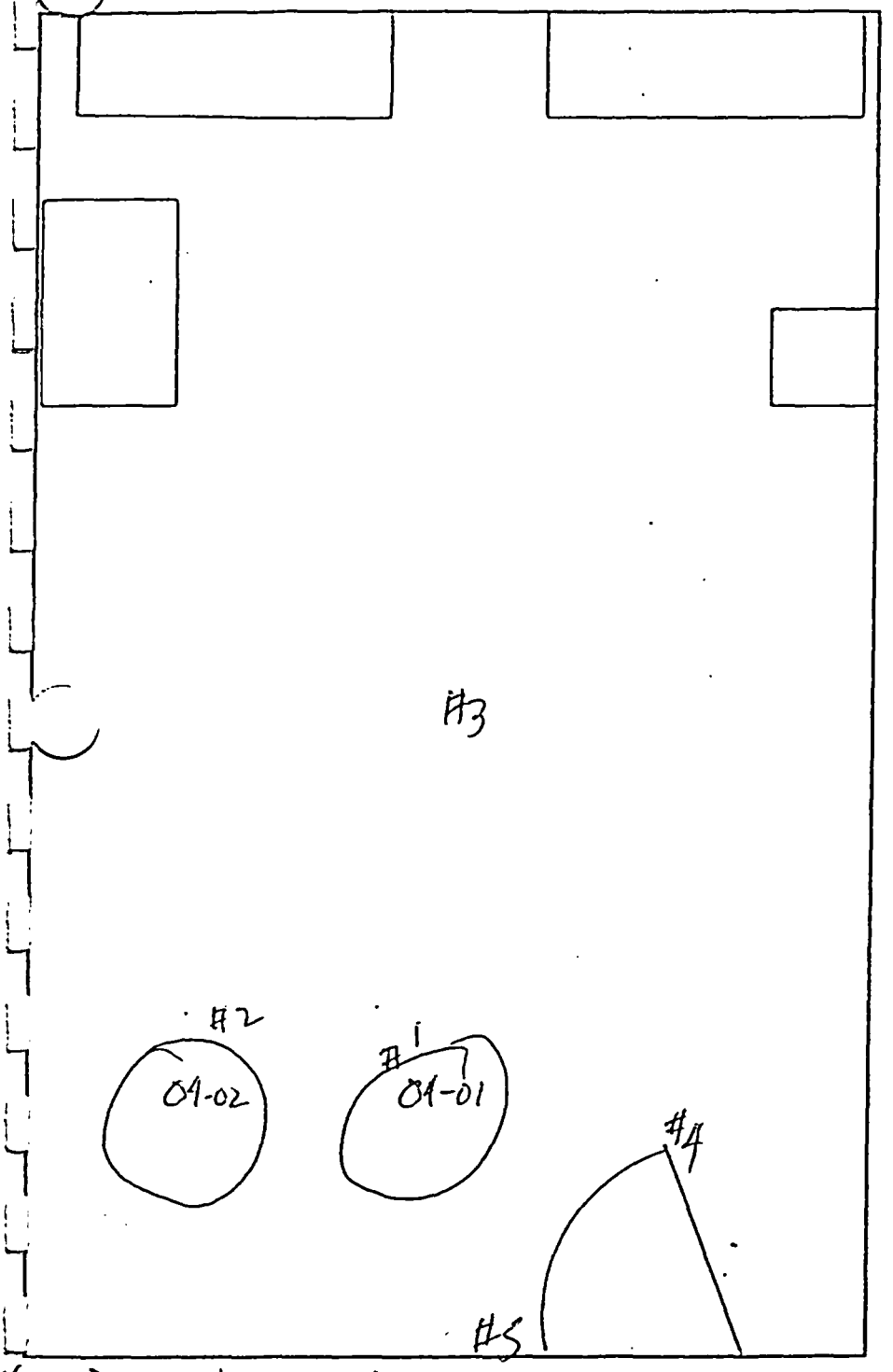
NHEERL-WED

RADIATION AREA SURVEY

LOG NO. 04-18

1/2

DATE 10/4/04 FIXED LOCATION CSB ROOM 1



SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
1	125	LLD₉₅	NO*
2	↓	↓	↓
3			
4			
5			

$LLD_{95} = \{(\sqrt{125}) \times 2.96\} \pm 158$ CPM

BACKGROUND 125 CPM

STANDARD (137Cs Cl) NIST 10,500 dpm

INSTRUMENT Ludlum #3

SERIAL NO. 77176

COMMENTS: NO* = NOT DETERMINED Below the decision limit.

Q Mo
RADIATION SPCL.

10/4/04
DATE

NHEERL-WED

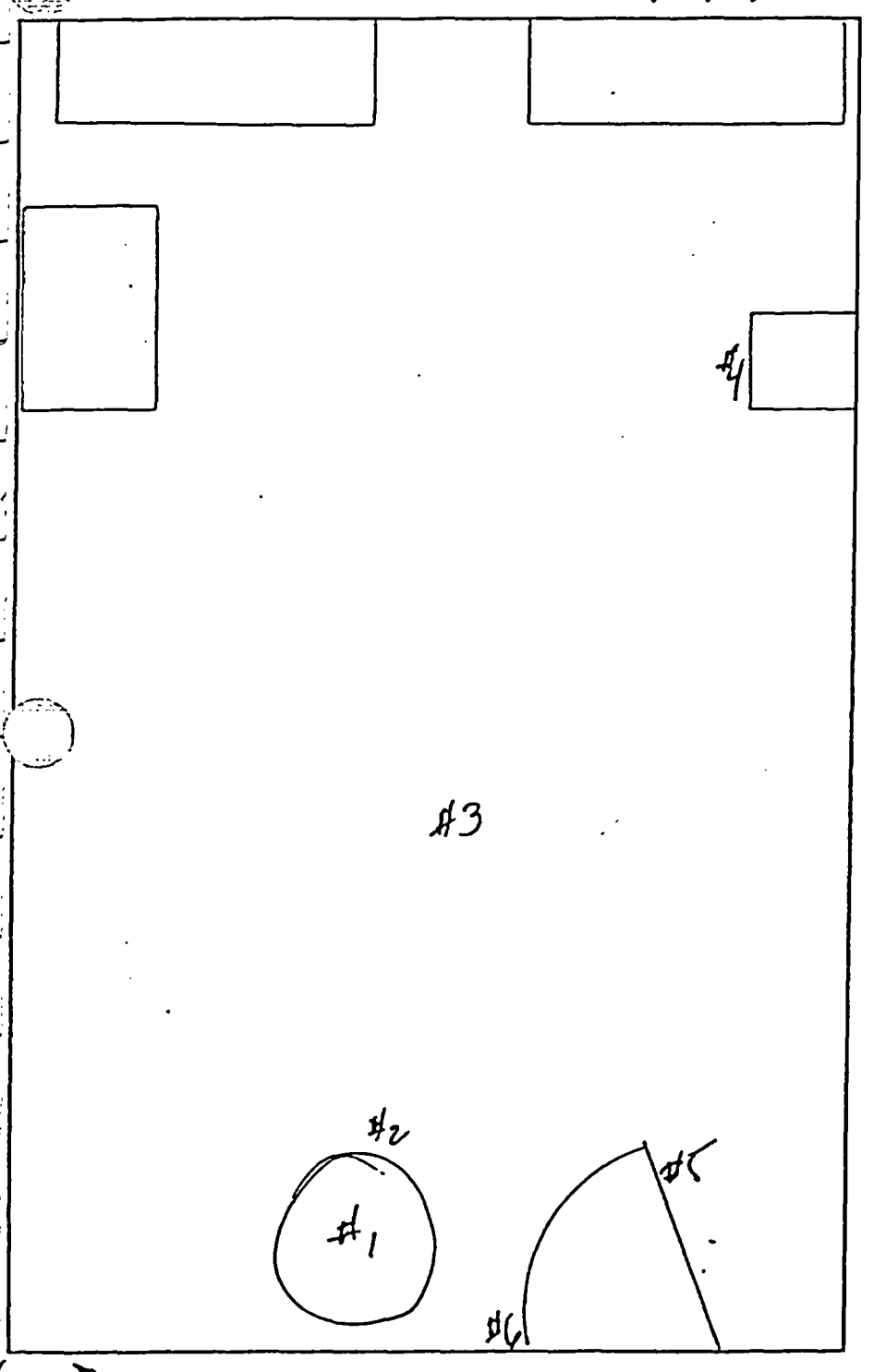
RADIATION AREA SURVEY

LOG NO. 04-01 #2

DATE 1/2/04 AM 1/2/04

LOCATION CSB ROOM 1

FIXED



SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
1	125	LLD85	ND*
2			
3			
4			
5			
6			

$LLD_{95} = \{(\sqrt{125}) \times 2.96\} + 159 = $ CPM

BACKGROUND 125 CPM

STANDARD (^{137}Cs @ 1/6') 10,500 dpm

INSTRUMENT Ludlum #3

SERIAL NO. 77176

COMMENTS: *ND = NOT DETERMINED. BELOW THE DETECTION LIMIT OF THE INSTRUMENT.

RADIATION SPCL. 1/2/04 DATE

U.S. Environmental Protection Agency
Western Ecology Division

NRC Radioactive Materials License No. 36-12343-02 Termination and Facility Decommissioning

Date: **November 27, 2004**
Subject: **Room Survey: Main Building and Newport Facility Unrestricted Areas Final Contamination Surveys.**

Five areas of the Main Building facilities and two unrestricted rooms, which to our knowledge were never used for radioisotope work, were surveyed in 2004 for total (fixed + removable) contamination. Ten areas of the Newport facility were surveyed for removable contamination.

Areas surveyed in the Main Building included four hallways, the library (MB 173), the copy center (MB 155), and one reference wall (MB 157). All areas surveyed (19 samples) were at background levels and ranging from 30 – 64 gross cpm/100 cm^2. The lower limits of detection for the survey instrument was generally 108 – 113 gross cpm. These areas meet the contamination criteria for unrestricted use based upon the isotopes used at our facilities.

Areas surveyed in the Newport Facility included seven hallways. All areas surveyed (7) indicated no contamination. These areas meet the contamination criteria for unrestricted use based upon the isotopes used at our facilities.

We considered it adequate to limit the survey of unrestricted areas to these fourteen locations because of the historic use of radioactive materials at our facilities. Records clearly demonstrate that contamination surveys were regularly performed and that unrestricted areas were never contaminated. These records also demonstrate that there were never any significant contamination events and the restricted areas were maintained as contaminate-free areas. We determined it was unnecessary to conduct further contamination surveys in these areas and other unrestricted areas of our facilities given these survey results and the Western Ecology Division's historic management of radioactive materials.

The survey was conducted using a Ludlum Model 2000 Scaler equipped with a Ludlum Model 44-9, 12-cm^2 thin-window Geiger-Muller pancake detector. Removable contamination was determined using wetted swipes counted in a Packard 2200 CA dual channel Liquid Scintillation Counter.

NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY

DATE 11-11-04 LOCATION _____ ROOM _____ INSTRUMENT FIXED Ludlum 2000 Scaler PANCAKE PROBE 44-9 SN 83810/PR070834

		Isotope β+δ			Isotope _____		
Swipe No.	Description	Gross CPM	Net DPM	Activity Bq/100 cm²	Gross CPM	Net DPM	Activity Bq/100 cm²
	MB Hall 134-133	38	LLD95	ND			
	MB Hall 190-191	30	↓	↓			
	MB Hall 228-231	50					
	MB Hall 294-295	46					
	Reference Wall 157 Hall	46					
		$LLD_{95}=((\frac{\sqrt{38}}{0.5}) \times 2.96)+76=$ 113 CPM			$LLD_{95}=((\text{---}) \times 2.96)+ =$ CPM		
		BACKGROUND 76			BACKGROUND		
		COUNT TIME 0.5 min			COUNT TIME		
		STANDARD (^{14}C 0.168 μCi) 10,540 CPM 2.8% eff			STANDARD ( )		

Phil Monaco 11-16-04

Comments: Radiation Safety Specialist Date

U.S. Environmental Protection Agency
Western Ecology Division

NRC Radioactive Materials License No. 36-12343-02 Termination and Facility Decommissioning

Date: November 27, 2004
Subject: Room Survey: Main Building 126 Final Contamination Survey.

Description and Historic Use:

Small double lab (350 ft^2). Potentially hydrogen-3 and carbon-14 tracers, and nickel-63 and hydrogen-3:scandium sealed sources. No isotope use since prior to 1986. There is no record of leakage of any sealed sources used in this area.

Surveys:

Total (fixed + removable) and removable contamination surveys were conducted in MB 126 in November 2004. This room was an unrestricted area since prior to 1986; radioactive materials were not used in this area after 1985.

All points surveyed (16 total and 16 removable) demonstrated no significant contamination. Seven points indicated very low levels of removable contamination from tritium (0.10 – 0.92 Bq/100 cm^2). All other sampling points were at background. This area meets the contamination criteria for unrestricted use based upon the isotopes used at our facilities. A HVAC duct swipe was made in November 2004 which detected 0.37 Bq/100 cm^2 of hydrogen-3.

Records for this room clearly demonstrate that contamination surveys were regularly performed, the area was not subject to any significant contamination events, and the room was maintained as a contaminate-free area. We determined it was unnecessary to conduct further contamination surveys in this area given these survey results and the Western Ecology Division's historic management of radioactive material use in this area. Records of the most recent historic surveys (i.e. prior to the final decommissioning surveys) of MB 126 are included in this report.

The survey for total contamination was conducted using a Ludlum Model 2000 Scaler equipped with a Ludlum Model 44-9, 12-cm^2 thin-window Geiger-Muller pancake detector. Removable contamination was determined using methanol-wetted swipes counted in a Packard 2200 CA dual channel Liquid Scintillation Counter.

NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY

FIXED SURVEY

DATE 11-11-04 LOCATION MB ROOM 126

INSTRUMENT Ludlum 2000 Scaler PANCake Probe 44-9

SERIAL NO. 83810 / PR070834

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
1.	24	LLD95	NA
2	20		
3	26		
4	30		
5	23		
6	26		
7	22		
8	28		
9	24		
10	20		
11	28		
12	24		
13	22		
14	24		
15	30		
16	24		

$LLD_{95} = \left\{\left(\frac{\sqrt{38}}{0.5}\right) \times 2.96\right\} + = 113$ CPM

BACKGROUND 75.3 CPM

STANDARD (^{14}C 0.168 µCi) 10,540 CPM

Time 0.5 min. 2.8% eff.

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²

$LLD_{95} = \left\{\left(\text{---------}\right) \times 2.96\right\} + =$ CPM

BACKGROUND _____

STANDARD ( ) _____

COMMENTS:

C. Moore
RADIATION SPCL.

11-16-04
DATE

NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY

DATE 11-11-04 LOCATION MB ROOM 126

INSTRUMENT LSC PACKARD 2200 CA

SERIAL NO. Q36755

SWIPE #	GROSS CPM	NET DPM (^3H)	ACTIVITY Bq/100 CM²
1	7	11	0.18
2	6	LLD95	ND
3	8	6	0.10
4	3	LLD95	ND
5	3	LLD95	ND
6	4	↓	ND
7	6	↓	ND
8	17	55	0.92
9	8	19	0.32
10	9	21	0.35
11	6	LLD95	ND
12	7	15	0.25
13	6	LLD95	ND
14	3	↓	↓
15	5	↓	↓
16	7	14	0.23

$LLD_{95} = \left\{\left(\frac{\sqrt{12}}{3}\right) \times 2.96\right\} + 4 =$ 7 CPM

BACKGROUND STANDARD (^3H) 4 CPM / 64,179 DPM / 56,056 DPM

2 DPM

87% eff

10

SWIPE #	GROSS CPM	NET DPM (^{14}C)	ACTIVITY Bq/100 CM²
	20	LLD95	ND
	16	↓	↓
	16	↓	↓
	17	↓	↓
	12	↓	↓
	13	↓	↓
	14	↓	↓
	15	↓	↓
	13	↓	↓
	12	↓	↓
	14	↓	↓
	13	↓	↓
	13	↓	↓
	15	↓	↓
	16	↓	↓
	15	↓	↓

$LLD_{95} = \left\{\left(\frac{\sqrt{66}}{3}\right) \times 2.96\right\} +$ 30 CPM

BACKGROUND STANDARD (^{14}C) 22 CPM / 84,000 DPM / 85,603

28 DPM

102% eff.

10

COMMENTS:

R. Moran
RADIATION SPCL.

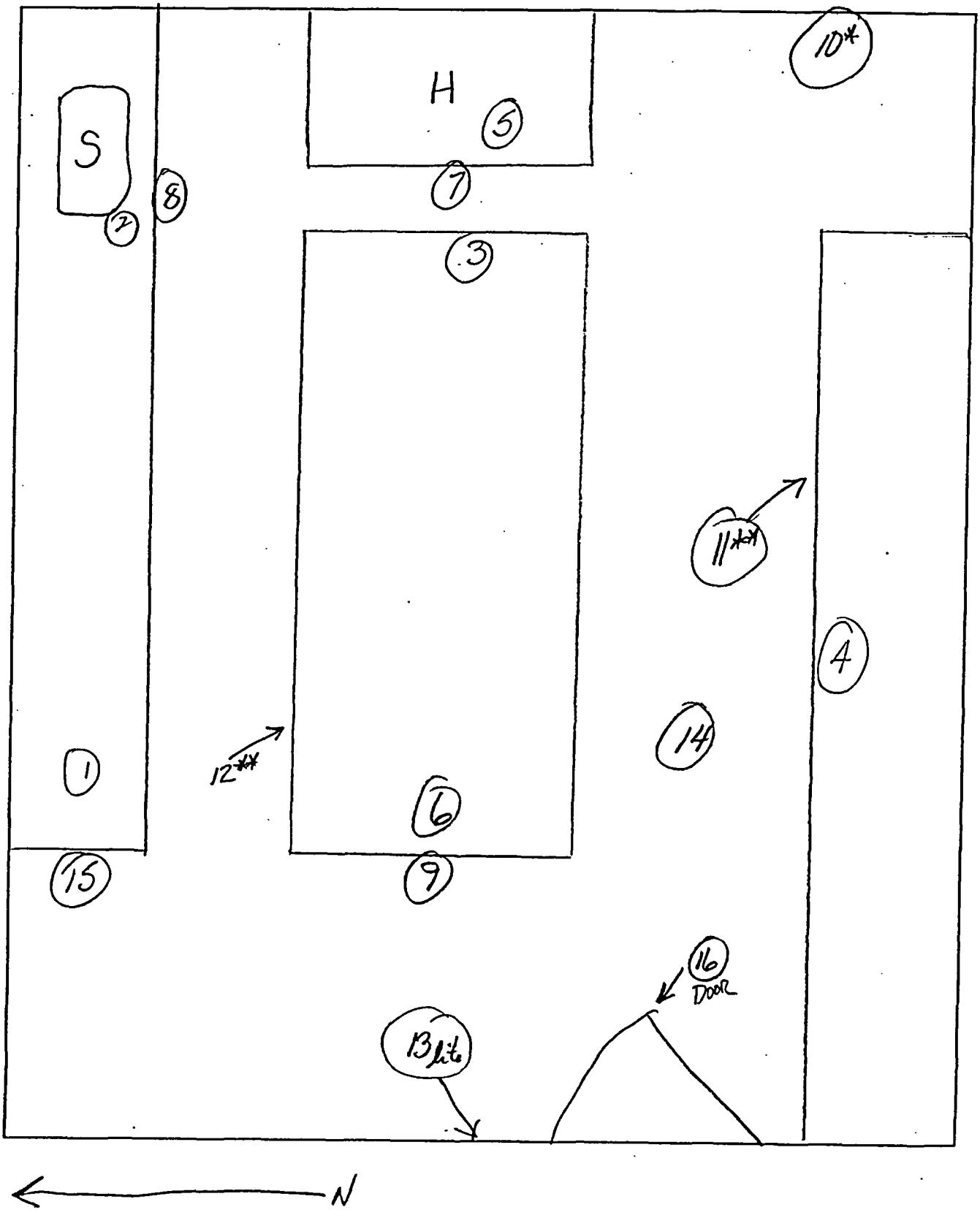
11-18-04
DATE

NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY MAP

LOCATION MB ROOM 126



UNITED STATES ENVIRONMENTAL PROTECTION
ENVIRONMENTAL RESEARCH LABORATORY—COR

SUBJECT Removal of Rooms 126 & 130 from Radiation status

FROM Jay Gile JDG

TO Radiation Safety Officer

Rooms 126 & 130 are no longer in experiments. The monitoring data i already been submitted, that from 130 to this memo. Neither room was when unoccupied therefore the re removal from the doors to both rooms

Approved 4/18/83
JDG
RSO

WEEKLY SWIPE SURVEY Week of 2/5/83 - 2/11/83

Mike 2/18/83 Swipes taken 2/11/83 Swipes counted 2/18/83 83-04

RAM #: 6
GION A: LL-UL= 0- 12 LCR= 0 BKG= 0 % 2 SIGMA= .2
GION B: LL-UL= 12- 156 LCR= 0 BKG= 0 % 2 SIGMA= .2
CLIDE 1 = 8031 NUCLIDE 2 = 42000
ME= 30.00 QIP= SIE/AEC SCR= B/A K= 1.000

S#	TIME	CPMA/K	%DEV	CPMB/K	%DEV	QIP	FLAGS	SCR	MIN	
		DPM1/K		DPM2/K						
1	30.00	18.17	8.57	52.93	5.02	585.	B1	2.914	31	BKGND - LIBRARY
2	30.00	18.20	8.56	53.00	5.02	549.	B	2.912	62	BKGND - COPY ROOM
3	30.00	8.67	12.4	15.60	9.25	576.	B	1.800	93	BKGND - Rm. 192
		15.01		40.51		570.		2.699		
5	30.00	.00	10.4	.00	9.62	486.	?	.000	124	126 - FLOOR BY HOOD
		.00		.00			?	.000		
6	30.00	.00	14.5	.00	9.24	510.	?	.000	155	126 - CENTER COUNTER
		.00		.00			?	.000		
7	30.00	.00	11.8	.00	7.76	541.	?	.000	186	126 - COUNTER LEFT OF HOOD
		.00		.00			?	.000		
8	30.00	.00	12.7	.00	9.50	567.	?	.000	217	126 - HOOD
		.00		.00			?	.000		
9	30.00	.00	15.4	.00	9.11	463.	?	.000	248	130: FLOOR BY HOOD
		.00		.00			?	.000		
10	30.00	.00	12.4	.00	7.08	526.	?	.000	278	130: HOOD
		.00		.00			?	.000		
11	30.00	.00	14.1	.00	9.35	509.	?	.000	309	130: BENCH BY OXIDIZER
		.00		.00			?	.000		
12	30.00	.00	11.7	.00	9.09	535.	?	.000	340	130: FLAMM. LIQ. CABINET
		.00		.00			?	.000		
13	30.00	.00	13.6	.00	9.39	529.	?	.000	371	132: S. BENCH
		.00		.00			?	.000		
14	30.00	.00	11.5	7.12	5.29	432.	?	.000	402	132: TOP OF GREEN CAB.
		0.00		9.26				.000		
15	30.00	.00	15.5	.00	9.50	456.	?	.000	433	132: FLOOR, IN CENTER
		.00		.00			?	.000		
16	30.00	.00	11.4	.00	6.52	572.	?	.000	464	132: HOOD
		.00		.00			?	.000		
17	30.00	.00	13.8	.00	9.43	538.	?	.000	495	134: TOP OF TMC #2
		.00		.00			?	.000		
18	30.00	.00	13.5	.00	9.61	539.	?	.000	526	134: FLOOR BY DOOR TO 132.
		.00		.00			?	.000		
19	30.00	.00	12.5	.00	9.62	567.	?	.000	557	134: E. BENCH
		.00		.00			?	.000		
20	30.00	.00	12.5	.00	9.96	565.	?	.000	588	134: FLOOR BY HALL
		.00		.00			?	.000		
21	30.00	.00	11.2	.00	9.85	603.	?	.000	619	190: WORK BENCH
		.00		.00			?	.000		
22	30.00	.00	14.1	.00	9.57	504.	?	.000	650	190: COUNTER BY RAM SINK
		.00		.00			?	.000		
23	30.00	.00	12.7	.00	9.27	507.	?	.000	681	190: AREA BY N. SINK
		.00		.00			?	.000		
24	30.00	.00	15.9	.00	9.59	490.	?	.000	711	190: COUNTER BY TYPEWRITER
		.00		.00			?	.000		

M. Mekuzak - Custer 2/22/83

WEEKLY SWIPE SURVEY

counted: 2/7/83

Week of 1/29/83 → 2/4/83

83-03

Mike

M. McKenzie-Carter

GRAM #: 6
ION A: LL-UL= 0- 12 LCR= 0 BKG= 0 % 2 SIGMA= .2
ION B: LL-UL= 12- 156 LCR= 0 BKG= 0 % 2 SIGMA= .2
LIDE 1 = 8031 NUCLIDE 2 = 42000
E= 30.00 QIP= SIE/AEC SCR= B/A K= 1.000

S#	TIME	CPMA/K DPM1/K	%DEV	CPMB/K DPM2/K	%DEV	QIP	FLAGS	SCR	MIN	
1	30.00	17.70	8.68	50.87	5.12	596.	B	2.874	31	LIBRARY } BKGND
2	30.00	16.63	8.95	54.70	4.94	556.	B	3.289	62	COPY ROOM } BKGND
3	30.00	7.37	13.4	16.03	9.12	577.	B	2.176	93	RM 192 } BKGND
		13.90		40.53		577.		2.916		
5	30.00	.00	15.2	.00	9.70	524.	?	.000	124	126 - HOOD
		.00		.00			?	.000		
6	30.00	.00	17.0	.00	9.61	424.	?	.000	155	126 - SE CORNER COUNTER
		.00		.00			?	.000		
7	30.00	.00	14.3	.00	9.01	488.	?	.000	186	126 - FLOOR BY RM 130
		.00		.00			?	.000		
8	30.00	.00	13.1	.00	9.35	535.	?	.000	217	126 - SOUTH COUNTER
		.00		.00			?	.000		
9	30.00	2.77	8.94	37.13	4.14	537.		13.422	248	130 - HOOD
		0.00		46.45				.000		
10	30.00	1.00	9.46	29.63	4.36	474.	1	29.633	278	130: DOOR by hall
		0.00		37.75				.000		
11	30.00	3.23	8.82	31.57	4.30	518.		9.763	309	130 - N. SINK
		0.00		39.61				.000		
12	30.00	2.27	9.08	29.10	4.38	545.		12.838	340	130 - WHITE POWDER ON CART
		0.00		36.35				.000		
13	30.00	12.07	7.17	31.77	4.29	552.	1	2.633	371	132: COUNTER BY HALL
		0.00		39.21				.000		
14	30.00	7.03	7.98	25.67	4.49	420.	1	3.649	402	132: FLOOR BY HALL
		0.00		33.15				.000		
15	30.00	4.37	8.54	27.00	4.44	416.	1	6.183	433	132: FLOOR BY DOOR
		0.00		35.11				.000		
16	30.00	8.67	7.69	54.53	3.75	571.	1	6.292	464	132 - HOOD
		0.00		67.60				.000		
17	30.00	.00	11.0	.00	5.74	497.	?	.000	495	134: E. COUNTER
		.00		.00			?	.000		
18	30.00	.00	16.6	.00	8.94	478.	?	.000	526	134: FLOOR BY HALL
		.00		.00			?	.000		
19	30.00	.00	16.3	.00	9.09	449.	?	.000	557	134: FLOOR BY TMC #1
		.00		.00			?	.000		
20	30.00	.00	18.6	.00	9.06	410.	?	.000	588	134: SINK
		.00		.00			?	.000		
21	30.00	4.77	8.45	.00	9.01	498.		.000	619	266 FLOOR BY HALL
		7.86		0.00				.000		
22	30.00	.00	15.0	.00	9.08	502.	?	.000	650	266 DESK TOP
		.00		.00			?	.000		
23	30.00	.00	10.5	.00	10.0	459.	?	.000	680	266 S. SINK
		.00		.00			?	.000		
24	30.00	.00	12.0	.00	9.52	501.	?	.000	711	266 FLOOR IN NW CORNER
		.00		.00			?	.000		

SWIPES OF RM 126 (CERL) 1/25/83

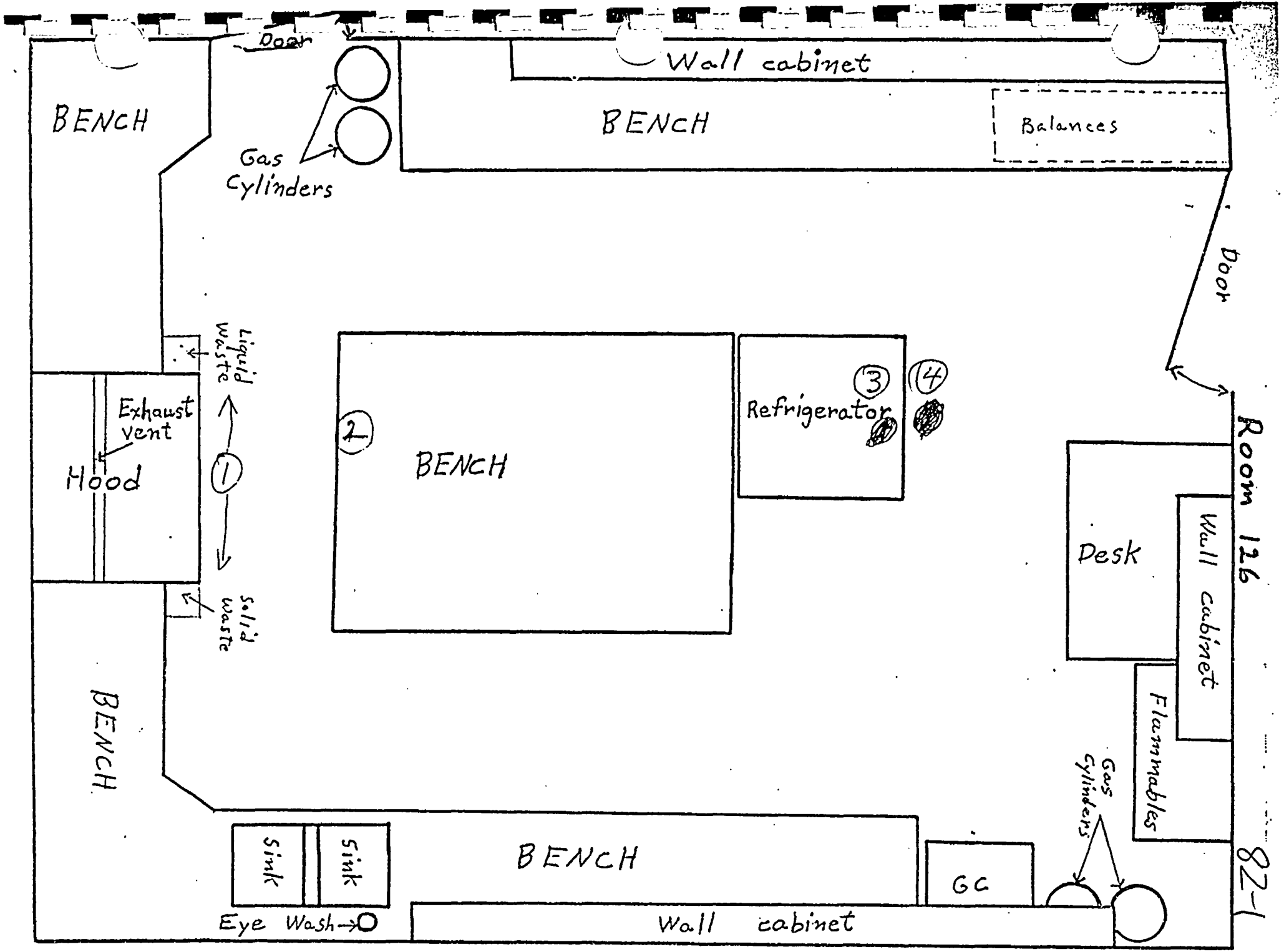
Special Survey #83-2

#	S#	TIME	CPMA/K DPM1/K	%DEV	CPMB/K DPM2/K	%DEV	QIP	FLAGS	SCR	MIN	
			24.29		.00				.000		
3	15	5.00	20.80	19.6	20.80	19.6	494.		1.000	89	
			23.69		.00				.000		
	16	5.00	20.00	20.0	20.00	20.0	490.		1.000	94	
			22.81		.00				.000		
3	17	5.00	23.20	18.5	22.80	18.7	519.		.983	100	
			26.14		.00				.000		
3	20	5.00	36.20	14.8	35.80	14.9	558.	1	.989	106	NORTH COUNTER-T
			40.25		.00				.000		
4	21	5.00	37.80	14.5	37.00	14.7	597.	1	.979	112	CENTER COUNTER
			41.88		.00				.000		
3	22	5.00	70.40	10.6	67.20	10.9	601.	1	.955	118	REFRIGERATOR
			77.97		.00				.000		
6	23	5.00	46.60	13.1	45.40	13.2	587.	1	.974	124	HOOD -
			51.68		.00				.000		
7	24	5.00	38.60	14.4	37.40	14.6	490.	1	.969	130	FLOOR INFRONT OF HOOD
			44.02		.00				.000		
3	25	5.00	36.60	14.7	36.60	14.7	467.	1	1.000	136	FLOOR BETWEEN
			42.03		.00				.000		N. & Center COUNTERS
9	26	5.00	35.20	15.0	35.00	15.1	518.	1	.994	141	FLOOR BETWEEN
			39.68		.00				.000		Center COUNTER & hood
10	27	5.00	40.20	14.1	39.00	14.3	510.	1	.970	147	FLOOR BETWEEN
			45.47		.00				.000		CENTER & S. COUNTERS
11	28	5.00	34.20	15.2	34.00	15.3	591.	1	.994	153	SOUTH COUNTER
			37.91		.00				.000		
12	29	5.00	42.40	13.7	40.60	14.0	586.	1	.958	159	DESK TOP
			47.03		.00				.000		
13	30	5.00	34.60	15.2	34.20	15.2	592.	1	.988	165	FLAMMABLE LIQ.
			38.36		.00				.000		CABINET.

No detectable contamination on any of the swipes

M. Melanson Carter

1/26/83


Door
Wall cabinet
BENCH
BENCH
Balances
Gas Cylinders
Door
Liquid waste
Exhaust vent
Hood
1
2
BENCH
3
4
Refrigerator
Room 126
Desk
Wall cabinet
Flammables
Gas Cylinders
Solid waste
BENCH
Sink
Sink
BENCH
GC
Eye Wash
Wall cabinet
82-1

Run 126

PROGRAM #:
REGION A: 6
REGION B: LL-UL= 0- 156 LCR= 0 BKG= 0 % 2 SIGMA= 1.0
TIME= 30 LL-UL= 4- 156 LCR= 0 BKG= 0 % 2 SIGMA= 1.0
1.00 QIP= SIE/REC SCR= A/B K= 1.000

P#	S#	TIME	CPMA/K DPM1/K	%DEV	CPMB/K DPM2/K	%DEV	QIP	FLAGS	SCR	MIN
6	1	30.00	26	7.14	22	7.71	848.	?	1.166	31
			27		0			?	.000	
6	2	30.00	26	7.22	22	7.84	860.	?	1.182	62
			27		0			?	.000	
6	3	30.00	60	4.72	56	4.88	883.	?	1.071	93
			62		0			?	.000	
6	4	30.00	33	6.40	29	6.80	842.	?	1.128	124
			34		0			?	.000	

Final Clean-up Swipes of Spill in Rm 126

REMOVABLE CONTAMINATION LEVELS (SMEARS)*

Dan Tullo — *Surveyor*

comprehensive swipes of Rad Areas — *Purpose of Survey*

12/11/81 — *Date*

81-08

	1	2	3	4	5	6	7	8
Location	BKG	Gross β cpm w/ ^3H	Net β cpm w/ ^3H	Gross β cpm w/o ^3H	Net β cpm w/o ^3H	Net β μCi w/o ^3H	Net ^3H cpm	Net ^3H μCi
RM 126 Hood sill	3.6	3.6	0.0					
Rm 126 floor by Hood	3.6	2.2	0.0					
126 Refrig	3.6	3.2	0.0					
130 Hood sill	3.6	3.6	0.0					
130 - floor by liq. waste	3.6	6.4 *	2.8					
130 - Refrig	3.6	4.4	1.2					
132 Hood sill	3.6	10.6 *	7.0					
132 Oxid. sill	3.6	8.4 *	4.8					
132 floor	4.2	4.4	0.2					
134 Bench	4.2	4.8	0.6					

* No smearing efficiency value is factored into these results.

Instrument used: NMC GFPC

$LLD_{(95\%)}$ = _____ cpm

$LLD_{(\beta\ w/o\ ^3H)}$ in μCi = _____ μCi

$LLD_{(^3H)}$ in μCi = _____ μCi

USE REVERSE SIDE FOR CALCULATIONS

81-15

REMOVABLE CONTAMINATION LEVELS (SMEARS)*

Dan Tullo
Surveyor

Swipes of Duct work in Room 126
Purpose of Survey

7/13/81
Date

Location	1 BKG	2 Gross β cpm w/ ^3H	3 Net β cpm w/ ^3H	4 Gross β cpm w/o ^3H	5 Net β cpm w/o ^3H	6 Net β μCi w/o ^3H	7 Net ^3H cpm	8 Net ^3H μCi
Front Duct I	17.7	14.0	0.0					
Front Duct II	17.7	14.5	0.0					
Front Duct III	17.7	13.5	0.0					
Rear Duct I	17.7	16.0	0.0					
Rear Duct II	17.7	15.0	0.0					
Ducts in ceiling (Front)	17.7	14.0	0.0					
Ducts in ceiling (Rear)	17.7	27.5	10.0					

* No smearing efficiency value is factored into these results.

Instrument used: _____

$LLD_{(95\%)}$ = _____ cpm

$LLD_{(\beta \text{ w/o } ^3H)}$ in μCi = _____ μCi

$LLD_{(^3H)}$ in μCi = _____ μCi

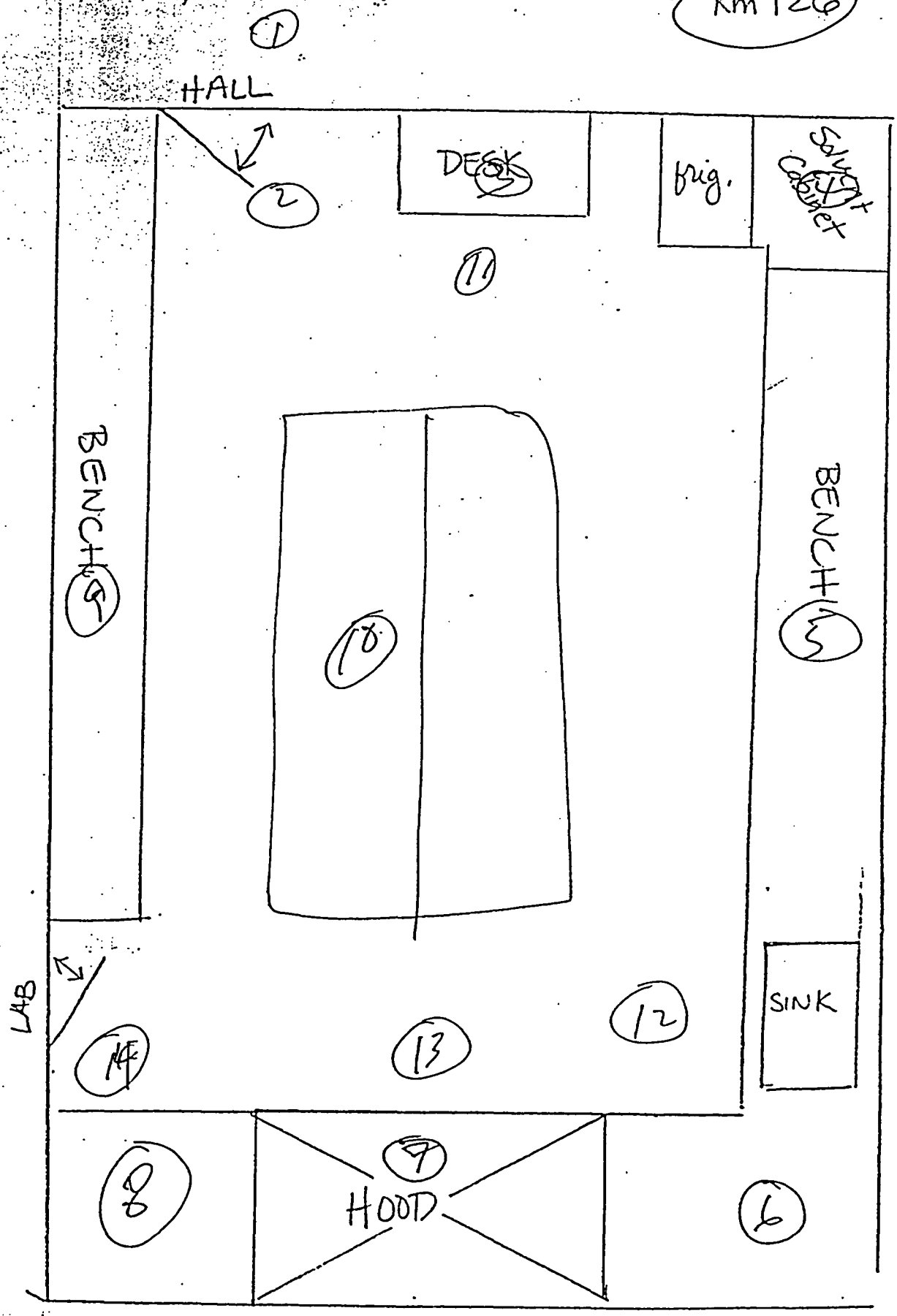
USE REVERSE SIDE FOR CALCULATIONS

FINAL CHECKOUT 1/14/81

J Collins

Rm 126

81-8



U.S. Environmental Protection Agency
Western Ecology Division

NRC Radioactive Materials License No. 36-12343-02 Termination and Facility Decommissioning

Date: **November 27, 2004**
Subject: **Room Survey: Main Building 129 Final Contamination Survey.**

Description and Historic Use:

Triple lab (MB 125) converted to an office (225 ft^2). Carbon-14 tracers, and nickel-63 and hydrogen-3:scandium sealed sources. No isotope use since prior to 1986. There is a record of a contamination event due to a tritium:scandium detector that was not properly vented. A record of the event and remediation is enclosed.

Surveys:

A total (fixed + removable) contamination survey was conducted in MB 129 in November 2004. This room has been an unrestricted area since prior to 1986; radioactive materials were not used in this area after 1985.

All points surveyed (6 total) demonstrated no contamination. This area meets the contamination criteria for unrestricted use based upon the isotopes used at our facilities.

We determined it was unnecessary to conduct further contamination surveys in this area given these survey results and the Western Ecology Division's historic management of radioactive material use in this area. A record of the most recent historic surveys (i.e. prior to the final decommissioning survey) of MB 129 is included in this report.

The survey for total contamination was conducted using a Ludlum Model 2000 Scaler equipped with a Ludlum Model 44-9, 12-cm^2 thin-window Geiger-Muller pancake detector.

NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY

FIXED SURVEY

DATE 11-16-04 LOCATION MB ROOM 129

INSTRUMENT Ludlum 2000 Scaler Pancake Probe 44-9

SERIAL NO. 83810 / PR070834

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
1	66	LLD95	NA
2	44	↓	↓
3	22		
4	32		
5	48		
6	42	↓	

$LLD_{95} = \left\{ \left(\frac{\sqrt{22}}{0.5} \right) \times 2.96 \right\} + = 72$ CPM

BACKGROUND STANDARD (^{14}C 0.16 µCi) 44 CPM / 11,790 CPM / 3.2%

Time 0.5 min.

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²

$LLD_{95} = \left\{ \left(\text{----------} \right) \times 2.96 \right\} + = $ CPM

BACKGROUND STANDARD ( ) _____

COMMENTS:

R Monaco
RADIATION SPCL.

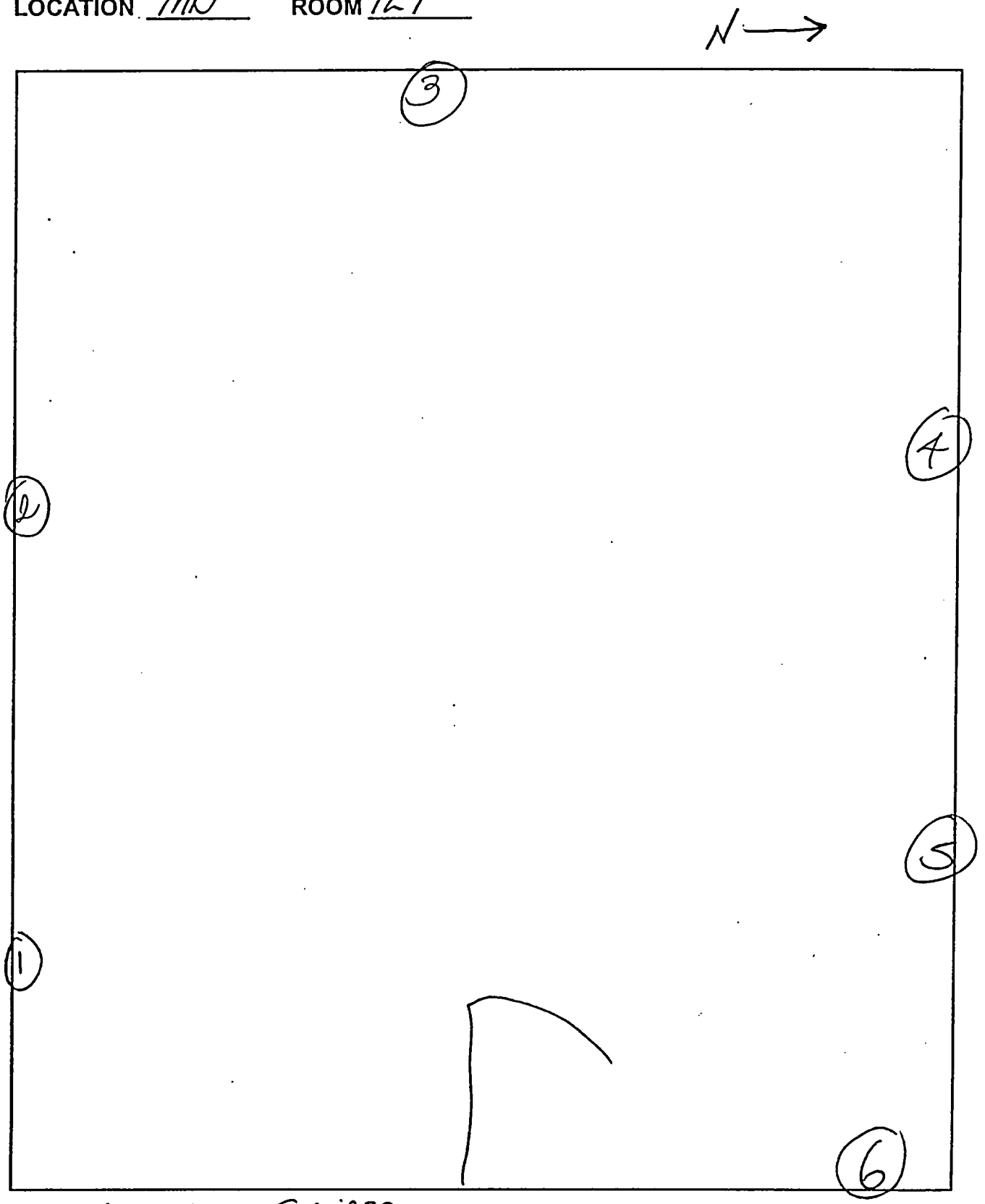
11-16-04
DATE

NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY MAP

LOCATION NIB ROOM 129



ALL WALL SWIPES

REMOVABLE CONTAMINATION LEVELS (SMEARS)*

DAN Tullo — *Surveyor*

Complete exit surveys — *Purpose of Survey*

10/28/81 — *Date*

81-07

	1	2	3	4	5	6	7	8
Location	BKG	Gross β cpm w/ ^3H	Net β cpm w/ ^3H	Gross β cpm w/o ^3H	Net β cpm w/o ^3H	Net β μCi w/o ^3H	Net ^3H cpm	Net ^3H μCi
Rm 130 - Sink	11.0	12.6	1.2					
Rm 130 - floor	11.0	8.4	0.0					
Rm ~~128~~ 129 on - Hood	11.0	8.4	0.0					
Rm ~~128~~ 129 floor	11.0	7.4	0.0					
Rm 128 - Middle Bench	11.0	10.8	0.0					
Hall outside 130	11.0	10.2	0.0					
Hall outside 132	11.0	12.4	1.4					
Rm 228 Hood Rt	6.0	4.8	0.0					
Rm 228 Refrig	6.0	7.2	1.2					
Rm 228 LSS	6.0	6.8	0.8					
Rm 228 Hood Lt	6.0	6.6	0.6					

* No smearing efficiency value is factored into these results.

Instrument used: _____

$LLD_{(95\%)}$ = _____ cpm

$LLD_{(\beta \text{ w/o } ^3H)}$ in μCi = _____ μCi

$LLD_{(^3H)}$ in μCi = _____ μCi

USE REVERSE SIDE FOR CALCULATIONS

Tritium Contamination Incident of 23 March 1979 April 5, 1979

M. H. Feldman, RSO

The Record

On 23 March 1979 a tritium contamination of room 125 was observed after use of the gas chromatograph and its scandium hydride source.

Roger Henderson [Northrup] was using the G.C. on a trial basis, over a six hour period (± 1 hour by personal estimate), to do an endosulfan analysis. The tritium sources has not been used in approximately 6 months but in the interim the safety exit tube [an original requirement the RSO had specified to Jay Gile (C.O.) to whom the source was entrusted] had been removed. In addition the vent to which the tube would have led was closed so no net flow from the G.C. exit port to the vent occurred. James Collins [Northrup] was unaware the vent was closed and failed to tell Henderson the safety exit tube was absent.

Tritium hot spats were observed in room 125 with some transfer to 130, 126, and 138, as well as 284, by personnel foot traffic. A small amount was found in corridors outside of 125, 130, 126.

During the following 3 days clean up operations were carried out to remove the floor contamination and decontamination is underway 4/2/79 on surfaces benches and property items in room 125.

During the times after first swipe detection of the contamination, personnel were monitored by bioassay for tritium content. For 4 persons monitored no tritium content above background was observed. For 5 persons a very low content, twice background in worst case was observed. This low body burden, giving a dose of about 0.3 MR (< 1/15,000 of annual allowable dose) is the first time any CERL personnel have had a body burden above background since the inception of the RSO program for Radiation Health and Safety.

In the future the following procedures will be used.

1. All safety items on the gear as approved by RSO will be utilized.

2. A sign listing safety point checks will be posted.

3. The temperature controller will be monitored while the run is underway.

In addition before this G.C. is put back into regular use, some safety tests will be made at short time intervals.

1. Check safety exit port tube for tritium contamination.

2. Check gas in N_2 tank for purity and check oxygen removal attachment for its action.

3. Try a small endosulfan injection followed by inspection of the safety tube.

CERL:TSAS:FELDMAN:bb:4/5/79:4670

U.S. Environmental Protection Agency
Western Ecology Division

NRC Radioactive Materials License No. 36-12343-02 Termination and Facility Decommissioning

Date: **November 27, 2004**
Subject: **Room Survey: Main Building 130 Final Contamination Survey.**

Description and Historic Use:

Single lab (225 ft^2). Potentially hydrogen-3, carbon-14, and chromium-51 tracers, and nickel-63 and hydrogen-3:scandium sealed sources. Hydrogen-3 and chromium-51 were used as tracers in the 1990's. This room was decommissioned as a unrestricted area on May 11, 1994. No isotope use since1994. There is no record of leakage of any sealed sources used in this area.

Surveys:

Total (fixed + removable) and removable contamination surveys were conducted in MB 130 at the time of restricted use decommissioning. All points surveyed demonstrated no significant contamination. This area meets the contamination criteria for unrestricted use based upon the isotopes used at our facilities. A HVAC duct swipe was made in November 2004 which detected 0.47 Bq/100 cm^2 of carbon-14.

Records for this room clearly demonstrate that contamination surveys were regularly performed, the area was not subject to any significant contamination events (a small tritium contamination event from a sealed source in MB 125 was reported in 1979), and the room was maintained as a contaminate-free area. We determined it was unnecessary to conduct further contamination surveys in this area given these survey results and the Western Ecology Division's historic management of radioactive material use in this area. Records of the most recent historic surveys (i.e. prior to the final decommissioning surveys) of MB 130 are included in this report.

The survey for total contamination was conducted using a Ludlum Model 3 Survey Meter equipped with a Ludlum Model 44-9, 12-cm^2 thin-window Geiger-Muller pancake detector. Removable contamination was determined using methanol-wetted swipes counted in a Packard 2200 CA dual channel Liquid Scintillation Counter.

file

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
ENVIRONMENTAL RESEARCH LABORATORY
200 S.W. 35TH STREET
CORVALLIS, OREGON 97333

M E M O R A N D U M

Date: May 11, 1994
From: Jay D. Giles, Radiation Safety Officer
To: Peter Beedlow, Branch Chief
Copies:

Subject: Decommissioning of MB 130 Laboratory

As of today, all radioactive materials are removed from the main building laboratory room 130. Following removal of the radioisotopes, all equipment used for isotope work as well as the hood, storage cabinets, and facilities were cleaned and surveyed for evidence of radio-contamination.

Results of the survey (on file) demonstrates that the laboratory is free from radioisotope contamination. All radiation signs, labels, and NRC postings are removed. The authorization to use radioactive materials in MB 130 is deactivated and the room decommissioned from service as an radioisotope lab. Lab MB 130 is now classified as a "non-restrictive use" work area.

If you wish to use radioisotopes in MB 130 in the future, petition for re-authorization by the Radiation Safety Committee must be pursued.

If you have questions, please contact me.

cc: C. McFarlane

U.S EPA
ENVIRONMENTAL RESEARCH LABORATORY -CORVALLIS

Log No. 94-8

RADIATION CONTAMINATION SURVEY

Date: 5-11-94 Type of Survey: REMOVABLE & FIXED

Isotope(s): β

Gross Background Counts: 17 ± CPM Total Count Time (min.): 2'

Lower Limits of Detection: (√17/2) 2.96 = 6 cpm

Instrument Used: ☐ GFPC ☒ LSC ☐ Ion Chamber ☐ ~~GM~~ ☐ Scintillation Model: Packard LSC 2200 S/N:

Background: 17 CPM±SD 19 DPM±SD Standard (^{14}C NEN 84,000): 80,390/84000 = 96% eff % Error

Swipe No.	Room No.	Swipe Description	Nuclide: REMOVABLE per 100 cm² Net CPM±SD	Net DPM	Net Activity pCi	Nuclide: FIXED per 100 cm² * CPM±SD	Net DPM	Net Activi
2	130	Cell HARVESTER	4	<LLD's	Ø			
	↓	Cell HARVESTER	9	29	13 pCi			
		Hood Floor - E	7	26	12			
5		Hood Floor - W	3	<LLD's	Ø		Ø net	
		Sill	1	<LLD's	Ø			
		SASH	7	26	12			
		Floor (Hood) - E	6	25	11			
		Floor (Hood) - W	11	31	14			
TB		Hood E WALL					Ø net	
		Hood W WALL						
		Hood Back WALL						
10		Cabinet (Hood) - E	2	<LLD's	Ø		Ø net	
11	↓	Cabinet (Hood) - W	7	26	12			

Comments: * Fixed: Ludlum #3 S/N 97146 ✓ 11,000 cpm BKGRD 100 cpm
14C eff 4.5%
All SWIPES Below action Level. ∴ NO further decon termination necessary.

Radiation Safety 5/12/94 Date

(9/90)

U.S EPA
ENVIRONMENTAL RESEARCH LABORATORY -CORVALLIS

Log No. 2/2

RADIATION CONTAMINATION SURVEY RM 130

Date: 5/12/94 Type of Survey: Removable Contamination

Isotope(s): β

Gross Background Counts: @ 21 ± CPM Total Count Time (min.): 2

Lower Limits of Detection: $(\sqrt{21}/2)2.96 = 7$ cpm

Instrument Used: ☐ GFPC ☒ LSC ☐ Ion Chamber ☐ GM ☐ Scintillation Model: LSC Packard 2200 S/N:

Background: 21 CPM±SD 23 DPM±SD Standard ( ): % Error

Swipe No.	Room No.	Swipe Description	Nuclide: ____ per 100 cm² Net CPM±SD	Net DPM	Net Activity	Nuclide: ____ per 100 cm² CPM±SD	Net DPM	Net Activity
2	130	Freezer (small) IN	2	<LLD95				
3		" " out	0	Ø				
4		refer NORTH IN	3	<LLD95				
5		" " out	0	Ø				
6		refer South in	0	Ø				
7		" " out	0	Ø				
8		incubator in	0	Ø				
9		" out	6	<LLD95				
10		Plate counter	6	<LLD95				
11		Desk/computer	0	Ø				

Comments:

Radiation Safety / Date

(9/90)

89-36 1/1

AREA CONTAMINATION SURVEY SHEET

Radionuclide(s) Surveyed: ^{35}S ^{51}Cr Date: 10/27/89

Method of Detection: LSC

Radiation Safety Technician

Cassette "B" & "C"

Swipe #	Location RM #	Area	Nuclide: NET CPM	NET DPM	µCi	Nuclide: NET CPM	NET DPM	µCi	
1	294	BKGD	23	N/A					
		N Hood sill	0						
		N. SASH	0						
		N. hood ex.	0						
		Floor (N Hood)	0						
		Floor (N counter)	0						
		Phone	0						
		door	0						
	130	DOOR	0						
		~~Floor~~ phone	0						
		Floor	0						
		Floor	0						
		Counter	2						
		Hood	0						
		Computer	0						

Calculation of Lower Limits of Detection (LLD)

	Nuclide: ~~230~~	Nuclide:
Gross Background Counts:	230	
Total Background Count time:	10	

LLD (95%) = $\sqrt{\frac{\text{Gross Background Counts}}{\text{Count Time}}}$ x 4.66

LLD (95%) =	7	

REMARKS:

89-8

Survey of 130 after clean up

AREA CONTAMINATION SURVEY SHEET

Radionuclide(s) Surveyed: 3H

Date: 5-19-89

Method of Detection: ~~LCS~~ LSC

[signature]
Radiation Safety Technician

Swipe #	Location RM #	Location Area	Nuclide: ~~NET CPM~~ Gross cpm	NET ~~DPM~~ CPM	~~µCi~~	DPM NET ~~CPM~~	~~NET DPM~~	µCi	
1		Backgrd	38.9	173		38.90			
2		Hood Floor	28.4	0					
3		Hood Floor	38.4	2		<			
4		Hood Sill	33.8	0					
5		Hood Sash	35.7	0					
6		Hood Wall Back	41.31	1		<			
7		Hood Wall Sides	35.78	0					
8		Hood Cabinet	41.36	1		<			
9		Refer	43.04	1		<			
10		Door	43.21	0					
11		Sink	32.51	0					
12		Phone	20.59	0					
13		Floor	54.62	0					
14		Floor	43.26	0					
15		Floor (Door)	31.72	0					

Calculation of Lower Limits of Detection (LLD) — Nuclide: 3H — Nuclide: ______

	Nuclide: 3H	Nuclide:
Gross Background Counts:	52	
Total Background Count time:	3'	

$$LLD\ (95\%) = \sqrt{\frac{\text{Gross Background Counts}}{\text{Count Time}}} \times 4.66$$

LLD (95%)= 11

REMARKS:

2.22×10^6 dpm/uCi
2.22×10^3 dpm/nCi
2.22 x

$.222 \times 10^4$ uC
2220×10 on
2.22 dpm/pC

AREA CONTAMINATION SURVEY SHEET

Radionuclide(s) Surveyed: 3H Date: 5-19-89

Method of Detection: LSC

Radiation Safety Technician

Swipe #	Location RM #	Area	Gross Nuclide: ~~NET~~ DPM	NET CPM ~~DPM~~	uCi	DPM Nuclide: NET ~~CPM~~	NET DPM	pCi ~~uCi~~	
16		Refer top	34.4	0					
17		N Counter	27.5	0					
18		S. Counter	36.5	0					
19		Back bottom Hood	159.21	35		120		54/100	cm^2
		109 dpm ^3H	188.8	~~67~~ 67		148		67	
		2924 dpm ^3H	2859.2	~~1291~~ 1291	P. Mum	2820			
		272 dpm ^3H	321.3	~~132~~ 132		282			

Calculation of Lower Limits of Detection (LLD) Nuclide: _____ Nuclide: _____

Gross Background Counts: _____ _____
Total Background Count time: _____ _____

$$LLD\ (95\%) = \sqrt{\frac{\text{Gross Background Counts}}{\text{Count Time}}} \times 4.66$$

LLD (95%)= _____ _____

REMARKS:

90--28

1/

AREA CONTAMINATION SURVEY SHEET

Radionuclide(s) Surveyed: ^{51}Cr Date: 7-6-90

Method of Detection: LSC-460 Radiation Safety Technician

Swipe #	Location RM #	Area	Nuclide: ^{3}H NET CPM	NET DPM	µCi	Nuclide: ^{14}C, ^{51}Cr, ^{35}S NET CPM	NET DPM	µCi
1		BKGRD	9.8	—	N/A	12	—	N/A
2	130	Counter	1	<		1	<	
3		Counter	0	N/A		0	N/A	
4		Floor	0	N/A		3	<	
5		Floor	0	N/A		0	N/A	
6		Desk	1	<		0	N/A	
7		Door	0	N/A	↓	5	6	↓

Calculation of Lower Limits of Detection (LLD) Nuclide: ^{3}H Nuclide: ^{14}C, ^{51}Cr, ^{35}S

Gross Background Counts: 100 120

Total Background Count time: 10' 10

(95%) = $\sqrt{\frac{\text{Gross Background Counts}}{\text{Count Time}}}$ x 4.66

LLD (95%)= 5 5

REMARKS:

U.S. Environmental Protection Agency
Western Ecology Division

NRC Radioactive Materials License No. 36-12343-02 Termination and Facility Decommissioning

Date: **November 27, 2004**
Subject: **Room Survey: Main Building 131 Final Contamination Survey.**

Description and Historic Use:

Triple lab (MB 125) converted to single office (225 ft^2). Carbon-14 tracers, and nickel-63 and hydrogen-3:scandium sealed sources. No isotope use since prior to1986. There is a record of a contamination event due to a tritium:scandium detector that was not properly vented. A record of the event and remediation is found under MB 129.

Surveys:

A total (fixed + removable) contamination survey was conducted in MB 131 in November 2004. This room has been an unrestricted area since prior to 1986; radioactive materials were not used in this area after 1985.

All points surveyed (6 total) demonstrated no contamination. This area meets the contamination criteria for unrestricted use based upon the isotopes used at our facilities.

We determined it was unnecessary to conduct further contamination surveys in this area given these survey results and the Western Ecology Division's historic management of radioactive material use in this area. A record of the most recent historic surveys (i.e. prior to the final decommissioning survey) of MB 131 is included in this report.

The survey for total contamination was conducted using a Ludlum Model 2000 Scaler equipped with a Ludlum Model 44-9, 12-cm^2 thin-window Geiger-Muller pancake detector.

NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY

FIXED SURVEY

DATE 11-16-04 LOCATION MB ROOM 131

INSTRUMENT Ludlum 2000 Scaler Pancake Probe 44-9

SERIAL NO. 83810 / PR070834

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
1	40	LLD95	NA
2	36		
3	36		
4	16		
5	24		
6	12		

$LLD_{95} = \left\{\left(\frac{\sqrt{22}}{0.5}\right) \times 2.96\right\} + = 72$ CPM

BACKGROUND STANDARD (^{14}C 0.168 µCi) 44 / 14,790 CPM 8.2%

Time 0.5 min.

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²

$LLD_{95} = \left\{\left(\text{---------}\right) \times 2.96\right\} + =$ CPM

BACKGROUND STANDARD ( ) _____

COMMENTS:

Q. Monar
RADIATION SPCL.

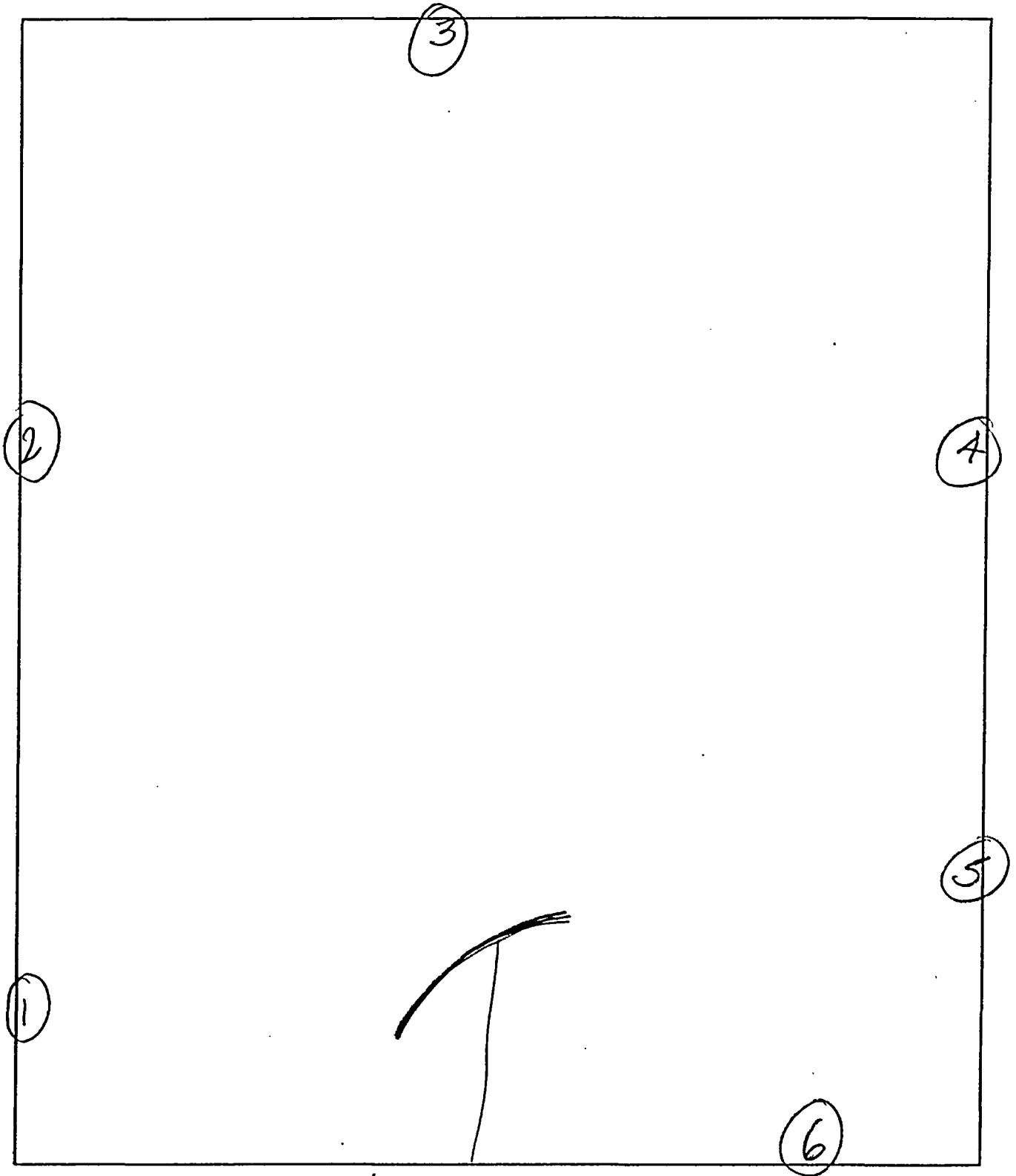
11-16-04
DATE

NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY MAP

LOCATION MB ROOM 131



ALL WALL SWIPES

84-32

131

WEEKLY AREA MONITORING: 11/13/84

GRAM #: 5
ION A: LL-UL= 0- 12 LCR= 0 BKG= 0 % 2 SIGMA= 10.0
REGION B: LL-UL= 12- 156 LCR= 0 BKG= 0 % 2 SIGMA= 10.0
NUCLIDE 1 = 434900 NUCLIDE 2 = 42000
TIME= 10.00 QIP= SIE/AEC SCR= B/A K= 1.000

P#	S#	TIME	CPMA/K DPM1/K	%DEV	CPMB/K DPM2/K	%DEV	QIP	FLAGS	SCR	MIN	
5	1	10.00	8.50	21.6	13.70	17.0	741.	B	1.612	11	
5	2	10.00	11.50	18.6	13.20	17.4	744.	B	1.148	22	Blanks
5	3	10.00	9.80	20.2	11.00	19.0	743.	B	1.122	33	
			9.93		12.63		743.		1.272		
5	4	10.00	1.37	18.8	4.17	15.4	691.		3.049	43	
			2.44		4.67				1.914		Rm 232/236
5	5	10.00	.00	23.7	3.97	15.5	698.	?	.000	54	
			0.00		4.84				.000		Rm 256
5	6	10.00	.00	20.3	6.67	14.4	644.	?	.000	65	
			0.00		8.16				.000		Rm 258
5	7	10.00	1.67	18.5	4.77	15.1	633.	(1)	2.860	76	
			3.41		5.30				1.554		Rm 190
5	8	7.39	.00	23.7	41.36	10.0	580.	(1)	.000	84	
			0.00		50.89				.000		Rm 131- Oil dip
5	9	10.00	.00	21.0	5.17	14.9	656.	?	.000	95	
	C		0.00		6.32				.000		Rm 132
5	10	10.00	2.57	17.8	4.57	15.2	633.	(1)	1.779	106	
			6.05		4.76				.787		Rm 131-Floor swipe
5	11	1.15	35.28	27.7	332.58	10.0	432.	(2)	9.426	108	
			53.20		400.51				7.529		Freeze dryer oil- 1 ml

Warren Jenkins 11/13/84

REMOVABLE CONTAMINATION LEVELS (SMEARS)*

80-04

BO Pickett — Surveyor | Weekly Survey — Purpose of Survey | 5/9/80 — Date

	1	2	3	4	5	6	7	8
Location	BKG	Gross β cpm w/ ^3H	Net β cpm w/ ^3H	Gross β cpm w/o ^3H	Net β cpm w/o ^3H	Net β μCi w/o ^3H	Net ^3H cpm	Net ^3H μCi
#131 Floor	45.6	45.8	< LLD 0.2	—	—	—	—	—
131 Desk	"	42.8	< LLD 0.0					
134 Floor	"	44.8	< LLD 0.0					
134 micro #1	"	47.6	< LLD 2.0					
126 Floor	"	45.0	< LLD 0.0					
126 bench	"	45.2	< LLD 0.0					
130 Floor	"	47.6	< LLD 2.0					
130 hood	"	46.8	< LLD 1.2					
190 floor	"	45.8	< LLD 0.2					
190 RAM stor	"	46.2	< LLD 0.6					

* No smearing efficiency value is factored into these results.

Instrument used: NMC GEPC

LLD(95%) = 14.1 cpm = 4.66 $\frac{\sqrt{228}}{5}$

$LLD_{(\beta\ w/o\ ^3H)}$ in μCi = 1.13×10^{-5} μCi

$LLD_{(^3H)}$ in μCi = _____ μCi

USE REVERSE SIDE FOR CALCULATIONS

REMOVABLE CONTAMINATION LEVELS (SMEARS)* 80-03

RD Pickett — Surveyor | Weekly Swipes — Purpose of Survey | 4/25/80 — Date

	1	2	3	4	5	6	7	8
Location	BKG	Gross β cpm w/ ^3H	Net β cpm w/ ^3H	Gross β cpm w/o ^3H	Net β cpm w/o ^3H	Net β μCi w/o ^3H	Net ^3H cpm	Net ^3H μCi
# 131 floor	37.2	35.2	< LLD 0.0	N/A	N/A	—	—	—
# 131 LSS	37.2	36.4	< LLD 0.0					
# 134 floor	37.2	38.0	< LLD 0.8					
# 134 microcosm	37.2	37.8	< LLD 0.6					
# 126 floor	37.2	34.8	< LLD 0.0					
# 126 bench	37.2	35.2	< LLD 0.0					
# 130 floor	37.2	35.0	< LLD 0.0					
# 130 bench	37.2	37.6	< LLD 0.4					

* No smearing efficiency value is factored into these results.

Instrument used: NMC GFPC I

LLD(95%) = 12.71 cpm = $4.66 \frac{\sqrt{186}}{5}$

LLD(β w/o ^3H) in μCi = _____ μCi

LLD(^3H) in μCi = _____ μCi

USE REVERSE SIDE FOR CALCULATIONS

U.S. Environmental Protection Agency
Western Ecology Division

NRC Radioactive Materials License No. 36-12343-02 Termination and Facility Decommissioning

Date: **November 27, 2004**
Subject: **Room Survey: Main Building 132 Final Contamination Survey.**

Description and Historic Use:

Single Lab (225 ft^2). Potentially hydrogen-3 and carbon-14 tracers, and nickel-63 and hydrogen-3:scandium sealed sources. No isotope use since prior to 1990. There is no record of leakage of any sealed sources used in this area.

Surveys:

Total (fixed + removable) and removable contamination surveys were conducted in MB 132 in November 2004. All points surveyed (12 total and 12 removable) demonstrated no significant contamination. Three points indicated very low levels of removable contamination from tritium (0.28 – 0.40 Bq/100 cm^2). All other sampling points were at background. This area meets the contamination criteria for unrestricted use based upon the isotopes used at our facilities. A HVAC duct swipe was made in November 2004 which detected contamination of 0.83 Bq/100 cm^2 of carbon-14.

Records for this room clearly demonstrate that contamination surveys were regularly performed, the area was not subject to any significant contamination events, and the room was maintained as a contaminate-free area. We determined it was unnecessary to conduct further contamination surveys in this area given these survey results and the Western Ecology Division's historic management of radioactive material use in this area. Records of the most recent historic surveys (i.e. prior to the final decommissioning surveys) of MB 132 are included in this report.

The survey for total contamination was conducted using a Ludlum Model 2000 Scaler equipped with a Ludlum Model 44-9, 12-cm^2 thin-window Geiger-Muller pancake detector. Removable contamination was determined using methanol-wetted swipes counted in a Packard 2200 CA dual channel Liquid Scintillation Counter.

NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY

FIXED SURVEY

DATE 11-11-04 LOCATION MB ROOM 132

INSTRUMENT Ludlum 2000 Scaler Pancake Probe 44-9

SERIAL NO. 83810 / PR070834

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
1	26	LLD95	NA
2	30		
3	24		
4	38		
5	22		
6	22		
7	16		
8	30		
9	30		
10	22		
11	28		
12	20		

$LLD_{95} = \left\{ \left(\frac{\sqrt{38}}{0.5} \right) \times 2.96 \right\}^{76}_{+} = 113$ CPM

BACKGROUND STANDARD (^{14}C 0.168 µCi) 76 CPM / 10540 CPM, 2.8% eff.

TIME 05'

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²

$LLD_{95} = \{ (\text{---------}) \times 2.96 \} + = $ CPM

BACKGROUND STANDARD ( ) _____

COMMENTS:

D Monaco
RADIATION SPCL.

11-16-04
DATE

NHEERL-WED

RADIATION AREA SURVEY

LOG NO. 04-23

DATE 11-11-04 LOCATION MB ROOM 132

INSTRUMENT Packard LSC 2200 CA

SERIAL NO. 836755

^{3}H

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
1	4	<LLD95	ND
2	4	↓	↓
3	8	17	0.28
4	6	<LLD95	ND
5	11	24	0.40
6	4	<LLD95	ND
7	4	↓	↓
8	6	↓	↓
9	10	20	0.33
10	4	<LLD95	ND
11	6	↓	↓
12	5	↓	↓

$LLD_{95} = \left\{\left(\frac{\sqrt{12}}{3}\right) \times 2.96\right\} + 4 =$ 7 CPM

BACKGROUND STANDARD (^{3}H 64,179 DPM) 4 CPM = 56,056 DPM

87% eff.

^{14}C

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
	17	<LLD95	ND
	15	↓	↓
	16	↓	↓
	13	↓	↓
	18	↓	↓
	18	↓	↓
	13	↓	↓
	13	↓	↓
	17	↓	↓
	17	↓	↓
	21	↓	↓
	16	↓	↓

$LLD_{95} = \left\{\left(\frac{\sqrt{66}}{3}\right) \times 2.96\right\} + 22 =$ 30 CPM

BACKGROUND STANDARD (^{14}C 89,600 DPM) 22 CPM = 85,603 DPM

102% eff.

COMMENTS:

D. Monaco
RADIATION SPCL.

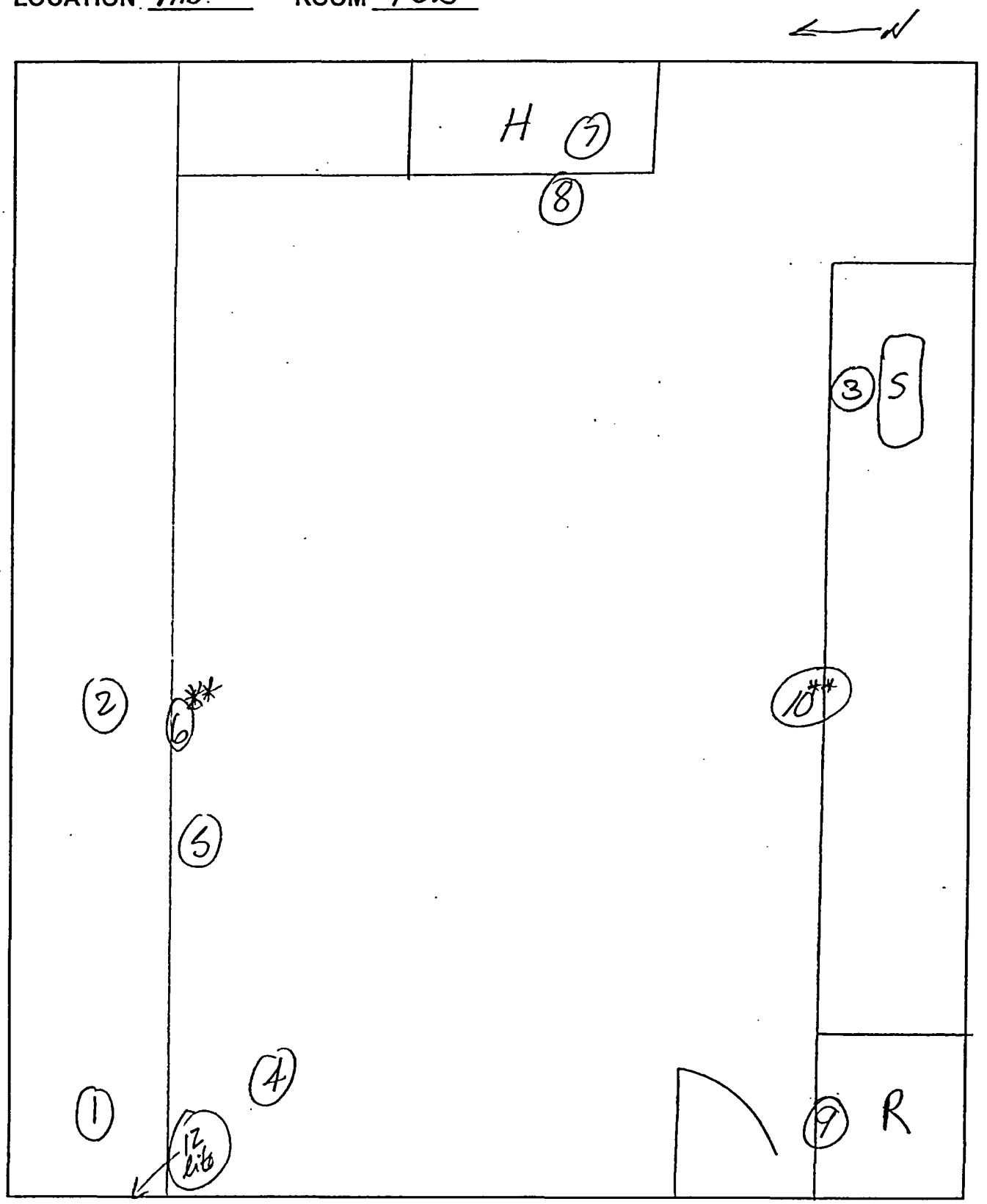
11-18-04
DATE

NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY MAP

LOCATION MD. ROOM 132



Log No. 90-40 1/3

U.S EPA
ENVIRONMENTAL RESEARCH LABORATORY -CORVALLIS

RADIATION CONTAMINATION SURVEY

Date: 12-3-90 Type of Survey: Non-Removable Contamination

Isotope(s): β & γ

Gross Background Counts: ± CPM Total Count Time (min.):

Lower Limits of Detection: $\sqrt{75} \times 4.66 = 40.4$ = 40.4 cpm

Instrument Used: ☒ GFPC ☐ LSC ☐ GM ☐ Ion Chamber ☐ Scintillation Model: Ludlum #3 S/N: 77222

Background: 75 CPM±SD DPM±SD Standard (137 CS ≅ lab [11k cpm): 11,025 cpm % Error

Swipe No.	Room No.	Swipe Description	Nuclide: per 100 cm² net CPM±SD	Net DPM	Net Activity	Nuclide: per 100 cm² CPM±SD	Net DPM	Net Activity
	138 MB	Hoods	Ø					
		Sink	Ø					
		Floor	Ø					
		Desk	Ø					
		Door	Ø					
	132	Hoods	Ø					
		Sink	Ø					
		Floor	Ø					
		Bench	Ø					
		door	Ø					
	258	Hood Rt. wall	450*					
		Floor	Ø					
		Sinks	Ø					
		Door	Ø					
	256	Hood	Ø					
		Floor	Ø					
		Phone	Ø					
		door	Ø					

Notes: * will label this non-removable contamination

[signature] 12/3/90
Radiation Safety Date

(9/90)

U.S EPA
ENVIRONMENTAL RESEARCH LABORATORY -CORVALLIS

Log No. ____ 2/3

RADIATION CONTAMINATION SURVEY

Date: _____ Type of Survey: _____

Isotope(s): _____

Gross Background Counts: _____ ± _____ CPM Total Count Time (min.): _____

Lower Limits of Detection: _____ = _____ cpm

Instrument Used: ☐ GFPC ☐ LSC ☐ GM ☐ Ion Chamber ☐ Scintillation Model: _____ S/N: _____

Background: _____ CPM±SD _____ DPM±SD Standard (_____): _____ % Error

Wipe No.	Room No.	Swipe Description	Nuclide: _____ per 100 cm² net CPM±SD	Net DPM	Net Activity	Nuclide: _____ per 100 cm² CPM±SD	Net DPM	Net Activity
	236	S. Hood	Ø					
		Floor	Ø					
		Sink	Ø					
		door	Ø					
		N. Hood	Ø					
	232B	Sink	Ø					
		Phone	Ø					
		Floor	Ø					
		Counter	Ø					
	228	S. Hood	Ø					
		Floor	Ø					
		door	Ø					
		Sink	Ø					
		N. Hood	Ø					
	236P	Photolab. -Sink	Ø					
		Floor	Ø					
		Counter	Ø					
	294	N. Hood	Ø					
		Floor	Ø					
		Sink	Ø					

Radiation Safety / Date

U.S EPA
ENVIRONMENTAL RESEARCH LABORATORY -CORVALLIS

Log No. _____ 3/3

RADIATION CONTAMINATION SURVEY

ce: _____ Type of Survey: _____

sotope(s): _____

oss Background Counts: _____ ± _____ CPM Total Count Time (min.): _____

ower Limits of Detection: _____ = _____ cpm

strument Used: ☐ GFPC ☐ LSC ☐ GM ☐ Ion Chamber ☐ Scintillation Model: _____ S/N: _____

kground: _____ CPM±SD _____ DPM±SD Standard (_____): _____ % Error

pe .	Room No.	Swipe Description	Nuclide: _____ per 100 cm²			Nuclide: _____ per 100 cm²		
			Net CPM±SD	Net DPM	Net Activity	CPM±SD	Net DPM	Net Activity
	294	S. Hood	Ø					
	C-1	door	Ø					
		1st floor	Ø					
	NERF	Rad Lab Hood	Ø					
		floor	Ø					
		Bench	Ø					
		door	Ø					

1

Radiation Safety Date

(ehp)

90-33

132

NRD

AREA CONTAMINATION SURVEY SHEET

Radionuclide(s) Surveyed: ^{3}H Date: 8/29/96

Method of Detection: LSC - 2200

QA. Mo
Radiation Safety Technician

Swipe #	Location RM #	Area	Nuclide: NET CPM	NET DPM	µCi	Nuclide: NET CPM	NET DPM	µCi
		BKGRD	(14)	(35)				
		STD	—	—				
	132	Hood sill	1	< LLD_{95}				
		Hood sash	8	< LLD				
		Hood interior	16	55				
		Hood interior	2	< LLD				
		Floor	12	58				
		Floor	6	< LLD				
		Floor (SW)	1	< LLD				
		door	2	< LLD				
		STD ^{3}H 278 dpm	195	352				
		STD ^{3}H 2924	1,532	2,804				
		STD ^{3}H 29,161	14,581	26,914				

Calculation of Lower Limits of Detection (LLD)

	Nuclide: ^{3}H	Nuclide:
Gross Background Counts:	42	
Total Background Count time:		

LLD (95%) = $\sqrt{\frac{\text{Gross Background Counts}}{\text{Count Time}}}$ x 4.66

LLD (95%) =	10	

REMARKS:

Post 132 BAP 3H Clean up

AREA CONTAMINATION SURVEY SHEET

Radionuclide(s) Surveyed: ^{3}H Date: 6-13-89

Method of Detection: LSC

Radiation Safety Technician

Swipe #	Location RM #	Area	Nuclide: NET CPM	NET DPM	µCi	Nuclide: NET CPM	NET DPM	µCi	
0	132	BKGRD	14	31					
1-12	↓	Glassware	Prior to final wash			(See printout)			
13		Hood Counter	3	< LLD					
14		Hood Sill	0						
15		Hood SASH	2	< LLD					
16		Hood VENT	0						
17		Hood WALL inside	4	< LLD					
18		Floor (by Hood	1	< LLD					
19		Floor (by Hood)	0						
20		Sink	0						
21		Sink	0						
22		Floor (by Sink)	0						
23		Floor (by Sink)	1	< LLD					
24		N. Counter	5	< LLD					
25		Phone	1	< LLD					

Calculation of Lower Limits of Detection (LLD)

	Nuclide: ^{3}H	Nuclide:
Gross Background Counts:	42	
Total Background Count time:	3	

(95%) = $\sqrt{\frac{\text{Gross Background Counts}}{\text{Count Time}}}$ x 4.66

LLD (95%) = 10

REMARKS:

AREA CONTAMINATION SURVEY SHEET

Radionuclide(s) Surveyed:_____ Date:_____

Method of Detection:_____

Radiation Safety Technician

Swipe #	Location RM #	Area	Nuclide: NET CPM	NET DPM	µCi	Nuclide: NET CPM	NET DPM	µCi	
		Door	0						
		Floor (by door)	7	< LLD					
		^{3}H STD 109	64	145					
		^{3}H STD 272	120	255					
		^{3}H STD 2,924	1315	2843					

Calculation of Lower Limits of Detection (LLD) Nuclide:_____ Nuclide:_____

Gross Background Counts: _____ _____

Total Background Count time: _____ _____

LLD (95%)= $\sqrt{\frac{\text{Gross Background Counts}}{\text{Count Time}}}$ x 4.66

LLD (95%)= _____ _____

REMARKS:

89-32

AREA CONTAMINATION SURVEY SHEET

Radionuclide(s) Surveyed: Cr^{51} Date: 9-8-89

F 10 Method of Detection: LSC-460

Radiation Safety Technician

BKGRD 23

Swipe #	Location RM #	Area	Nuclide: NET CPM	NET DPM	µCi	Nuclide: NET CPM	NET DPM	µCi
2	132	Door	8	8				
3		Floor E	0	N/A				
4		N Counter	0	N/A				
5		S Counter	1	< LLD95				
6		W Floor	3	< LLD95				
7		Desk	0	N/A				
8		hood	0 DPM	N/A				
9		hood exhaust	0 DPM	< LLD95				
10		hood sill	0	N/A				
		STD C^{14} 1079	1,053	1,132				
		STD C^{14} 10400	10,022	10,785				
		STD C^{14} 109,000	100,377	108,012				

Calculation of Lower Limits of Detection (LLD) Nuclide: Cr^{51} Nuclide: ____

Gross Background Counts: 230 ____

Total Background Count time: 10' ____

LLD (95%) = $\sqrt{\frac{\text{Gross Background Counts}}{\text{Count Time}}} \times 4.66$

LLD (95%) = 7 ____

REMARKS:

U.S. Environmental Protection Agency
Western Ecology Division

NRC Radioactive Materials License No. 36-12343-02 Termination and Facility Decommissioning

Date: **November 27, 2004**
Subject: **Room Survey: Main Building 133 Final Contamination Survey.**

Description and Historic Use:

Triple lab (MB 125) converted to single office (225 ft^2). Carbon-14 tracers, and nickel-63 and hydrogen-3:scandium sealed sources. No isotope use since prior to1986. There is a record of a contamination event due to a tritium:scandium detector that was not properly vented. A record of the event and remediation is found under MB 129.

Surveys:

A total (fixed + removable) contamination survey was conducted in MB 131 in November 2004. This room has been an unrestricted area since prior to 1986; radioactive materials were not used in this area after 1985.

All points surveyed (6 total) demonstrated no contamination. This area meets the contamination criteria for unrestricted use based upon the isotopes used at our facilities.

We determined it was unnecessary to conduct further contamination surveys in this area given these survey results and the Western Ecology Division's historic management of radioactive material use in this area. A record of the most recent historic surveys (i.e. prior to the final decommissioning survey) of MB 133 is included in this report.

The survey for total contamination was conducted using a Ludlum Model 2000 Scaler equipped with a Ludlum Model 44-9, 12-cm^2 thin-window Geiger-Muller pancake detector.

NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY

FIXED SURVEY

DATE 11-16-04 LOCATION MB ROOM 1331

INSTRUMENT Ludlum 2000 Scaler PAncake Probe 44-9

SERIAL NO. 83810 / PR070834

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
1	38	LLD95	NA
2	32	0	
3	36		
4	38		
5	36		
6	38		

$LLD_{95} = \left\{\left(\frac{\sqrt{22}}{0.5}\right) \times 2.96\right\} + = 72$ CPM

BACKGROUND STANDARD (^{14}C 0.168 μCi) 44 / 4,790 CPM 3.2%

TIME 0.5 min.

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²

$LLD_{95} = \left\{\left(\text{---------}\right) \times 2.96\right\} + =$ CPM

BACKGROUND STANDARD ( )

COMMENTS:

D Monaco
RADIATION SPCL.

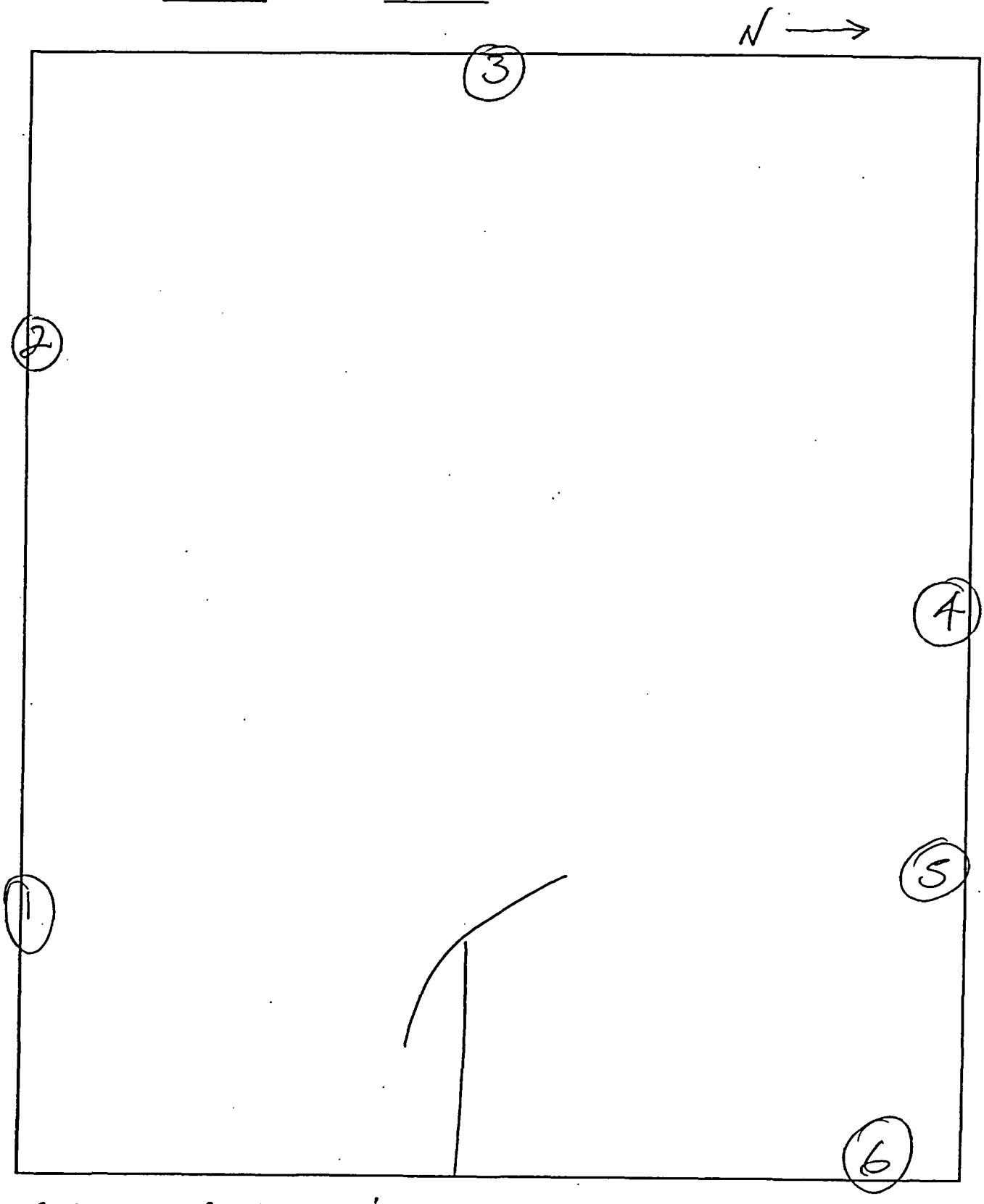
11-16-04
DATE

NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY MAP

LOCATION NB ROOM 133



All Wall Surveys

Surveys, 12/2, 12/9, cont. 1-5-84

83

#	S#	TIME	CPMA/K DPM1/K	%DEV	CPMB/K DPM2/K	%DEV	QIP	FLAGS	SCR	MIN	
	26	30.00	1.28 1.70	13.0	.00 0.00	8.90	576.	RM 132	.000 .000	803	TABLE SURFACE ALONG N. WALL
	27	30.00	.98 1.29	13.3	.00 0.00	10.0	580.	RM	.000 .000	834	FLOOR BY LSC
	28P	30.00	1.78 2.84	12.6	.00 0.00	8.91	506.	133	.000 .000	865	FLOOR BY FREEZE DRYER
	29	30.00	5.01 4.15	10.7	3.40 4.04	7.70	548.		.678 .974	896	FREEZE DRYER
	30	30.00	26.14 0.00	6.39	387.20 495.88	1.81	458.		14.810 .000	926	ROOT RINSE ALIQUOT
	31	30.00	.24 .31	14.0	.00 0.00	10.3	601.	12/9/83 RM	.000 .000	957	MICROCOSM 7
	32	30.00	.88 1.10	13.4	.00 0.00	10.0	602.	G-3	.000 .000	988	TABLETOP BY SINK
	33	30.00	.00 .00	16.2	.00 .00	9.93	530.	? ?	.000 .000	1019	FLOOR BY DRY WASTE
	34	30.00	.91 1.13	13.3	.00 0.00	10.1	609.		.000 .000	1050	ANALYTIC BALANCE
	35	30.00	3.71 1.05	11.4	4.80 5.85	7.47	548.	RM 256	1.293 5.558	1081	TABLETOP BY SINK
	36	30.00	2.08 2.63	12.4	.00 0.00	8.85	598.		.000 .000	1112	HOOD SASH
	37	30.00	.98 1.27	13.3	.00 0.00	9.63	587.		.000 .000	1143	INTERIOR OF BROKEN GLASS CONTAINER
	38	30.00	8.44 0.00	9.44	30.27 37.25	5.20	591.		3.584 .000	1173	OXIDIZER
	39	30.00	.88 1.12	13.4	.00 0.00	9.19	596.	RM	.000 .000	1204	HOOD FLASHING
	40	30.00	.68 .89	13.6	.00 0.00	9.76	582.	258	.000 .000	1235	HOOD SASH
	41	30.00	.54 .69	13.7	.00 0.00	10.0	597.		.000 .000	1266	DOOR HANDLE
	42	30.00	.38 .50	13.9	.00 0.00	9.61	583.		.000 .000	1297	TABLETOP BY CHART RECORDER
	43	30.00	.38 .61	13.9	.00 0.00	8.47	504.	RM	.000 .000	1328	FLOOR SPILL
	44	30.00	1.88 0.00	12.6	7.27 8.97	7.12	576.	G-3	3.870 .000	1359	MICROCOSM 14
	45	30.00	.00 .00	14.6	.00 .00	9.81	577.	? RM ? 190	.000 .000	1389	TABLETOP BY SINK
	46	30.00	77.44 0.00	3.98	1331.40 1768.59	.99	388.	?	17.192 .000	1420	AQUEOUS SOLNS FROM G-3

Warren K Lewis 1/5/84

REMOVABLE CONTAMINATION LEVELS (SMEARS)*

Dan Tullo H.P. — Surveyor

Weekly Swipe Survey — Purpose of Survey

8/17/82 — Date

	1	2	3	4	5	6	7	8
Location	BKG	Gross β cpm w/ ^3H	Net β cpm w/ ^3H	Gross β cpm w/o ^3H	Net β cpm w/o ^3H	Net β μCi w/o ^3H	Net ^3H cpm	Net ^3H μCi
G.C. Top Rm 149 surface	32.2	62.3	30.1					.011
G.C. oven Rm 149	32.2	87.0	54.8					.021
front Top 149 controls G.C.	32.2	16,491	16,459					.6.178
130 Hood	32.2	55.3	23.1					2×10^{-5}
130 Bench	32.2	45.3	13.1					—
132 Oxidizer	32.2	33.0	0.8					—
132 Hood	32.2	132.6	100.4					9×10^{-5}
134 Hall outside	32.2	34.6	2.4					—
134 Bench	32.2	37.6	5.4					—
134 floor	32.2	40.0	7.8					

* No smearing efficiency value is factored into these results.

Instrument used: _____

$LLD_{(95\%)}$ = _____ cpm

$LLD_{(\beta \text{ w/o } ^3H)}$ in μCi = _____ μCi

$LLD_{(^3H)}$ in μCi = _____ μCi

USE REVERSE SIDE FOR CALCULATIONS

(2)

REMOVABLE CONTAMINATION LEVELS (SMEARS)*

Dan Tullo — *Surveyor*

Week of swipes (cont) — *Purpose of Survey*

8/17/82 — *Date*

	1	2	3	4	5	6	7	8
Location	BKG	Gross β cpm w/ ^3H	Net β cpm w/ ^3H	Gross β cpm w/o ^3H	Net β cpm w/o ^3H	Net β μCi w/o ^3H	Net ^3H cpm	Net ^3H μCi
133 floor by Door	32.2	37.0	4.8					
133 Spectrophoton	32.2	37.3	5.1					
126 Hood	32.2	45.3	13.1					
126 Bench	32.2	34.3	2.1					
238 Bench G.C.	32.2	39.3	7.1					
238 Sink Alt.	32.2	41.3	9.1					
246 Hood	32.2	38.3	6.1					
266 floor/Door	32.2	39.6	7.4					
266 fire Door/floor	32.2	44.6	12.5					
266 Hood	32.2	40.0	7.8					

* No smearing efficiency value is factored into these results.

Instrument used: _____

$LLD_{(95\%)}$ = _____ cpm

$LLD_{(\beta\ w/o\ ^3H)}$ in μCi = _____ μCi

$LLD_{(^3H)}$ in μCi = _____ μCi

USE REVERSE SIDE FOR CALCULATIONS

REMOVABLE CONTAMINATION LEVELS (SMEARS)*

Comprehensive swipe

Dan Tullo — *Surveyor*

Survey — *Purpose of Survey*

4/19/82 — *Date*

81

82-02

	1	2	3	4	5	6	7	8
Location	BKG	Gross β cpm w/ ^3H	Net β cpm w/ ^3H	Gross β cpm w/o ^3H	Net β cpm w/o ^3H	Net β μCi w/o ^3H	Net ^3H cpm	Net ^3H μCi
Rm 133 L.S.S.	4.1	4.7	0.6					
" Refrig 27	4.1	4.8	0.7					
" Refrig 33	4.1	5.1	1.0					
" Door	4.1	5.9	1.8					
Hall outside 133	4.1	6.7	2.6					
Rm 134 Microscope floor	4.1	10.3	6.2	—				
" Door	4.1	5.9	1.8					
" floor (door)	8.0	9.1	1.1					
Rm 132 Hood sill	8.0	2685	260.5	*				
" Oxidizer area	8.0	23.6	15.6	+				

* No smearing efficiency value is factored into these results.

Instrument used: _____

$LLD_{(95\%)}$ = _____ cpm

$LLD_{(\beta \text{ w/o } ^3H)}$ in μCi = _____ μCi

$LLD_{(^3H)}$ in μCi = _____ μCi

USE REVERSE SIDE FOR CALCULATIONS

REMOVABLE CONTAMINATION LEVELS (SMEARS)*

Surveyor	Swipes count Purpose of Survey	12/11/81 Date

	1	2	3	4	5	6	7	8
Location	BKG	Gross β cpm w/ ^3H	Net β cpm w/ ^3H	Gross β cpm w/o ^3H	Net β cpm w/o ^3H	Net β μCi w/o ^3H	Net ^3H cpm	Net ^3H μCi
134 - Floor	4.2	4.0	0.0					
Hall - outside 132	4.2	3.8	0.0					
133 - floor	4.2	3.4	0.0					
133 - Door	4.2	4.2	0.0					
236 - Corridor	4.2	5.0	0.8					
236 - Refrig	4.2	4.4	0.2					
228 - Hood	4.2	4.2	0.0					
228 - Bench	4.2	5.0	0.8					
228 - Refrig	4.2	4.8	0.6					

* No smearing efficiency value is factored into these results.

Instrument used: _____

$LLD_{(95\%)}$ = _____ cpm

$LLD_{(\beta\ w/o\ ^3H)}$ in μCi = _____ μCi

$LLD_{(^3H)}$ in μCi = _____ μCi

USE REVERSE SIDE FOR CALCULATIONS

REMOVABLE CONTAMINATION LEVELS (SMEARS)*

DAN Tullo — *Surveyor*

Complete exit swipes — *Purpose of Survey*

10/28/81 — *Date*

81-07

	1	2	3	4	5	6	7	8
Location	BKG	Gross β cpm w/ ^3H	Net β cpm w/ ^3H	Gross β cpm w/o ^3H	Net β cpm w/o ^3H	Net β µCi w/o ^3H	Net ^3H cpm	Net ^3H µCi
Rm 130 - Sink	11.0	12.6	1.2					
Rm 130 - floor	11.0	8.4	0.0					
Rm 128 - Hood	11.0	8.4	0.0					
Rm 128 - floor	11.0	7.4	0.0					
Rm 128 - Middle Dock	11.0	10.8	0.0					
Hall outside 130	11.0	10.2	0.0					
Hall outside 132	11.0	12.4	1.4					
Rm 228 Hood Rt	6.0	4.8	0.0					
Rm 228 Refrig	6.0	7.2	1.2					
Rm 228 LSS	6.0	6.8	0.8					
Rm 228 Hood Lt	6.0	6.6	0.6					

* No smearing efficiency value is factored into these results.

Instrument used: _____

$LLD_{(95\%)}$ = _____ cpm

$LLD_{(\beta\ w/o\ ^3H)}$ in µCi = _____ µCi

$LLD_{(^3H)}$ in µCi = _____ µCi

USE REVERSE SIDE FOR CALCULATIONS

REMOVABLE CONTAMINATION LEVELS (SMEARS)*

DAN Tullo
Surveyor

Comprehensive swipes of All Rad. Areas
Purpose of Survey

10/28/81
Date

81-07

	1	2	3	4	5	6	7	8
Location	BKG	Gross β cpm w/ ^3H	Net β cpm w/ ^3H	Gross β cpm w/o ^3H	Net β cpm w/o ^3H	Net β μCi w/o ^3H	Net ^3H cpm	Net ^3H μCi
Room 150 G.C.	11.0	7.2	0.0					
Rm. 133 LSS	11.0	10.6	0.0					
Rm 133 floor	11.0	8.8	0.0					
Rm 133 Door	11.0	10.8	0.0					
Rm 134 Bench	11.0	9.2	0.0					
Rm 134 floor	11.0	10.6	0.0					
Rm 132 - Hood	11.0	10.4	0.0					
Rm 132 - Oxidizer	11.0	11.8	0.8					
Rm 132 - floor	11.0	8.4	0.0					
Rm 130 - Hood	11.0	16.4	5.4					

* No smearing efficiency value is factored into these results.

Instrument used: GFPC RM 190

$LLD_{(95\%)}$ = _____ cpm

$LLD_{(\beta \text{ w/o } ^3H)}$ in μCi = _____ μCi

$LLD_{(^3H)}$ in μCi = _____ μCi

USE REVERSE SIDE FOR CALCULATIONS

REMOVABLE CONTAMINATION LEVELS (SMEARS)*

Tullo — *Surveyor*

Swipe — *Purpose of Survey*

10/1/81 — *Date*

	1	2	3	4	5	6	7	8
Location	BKG	Gross β cpm w/ ^3H	Net β cpm w/ ^3H	Gross β cpm w/o ^3H	Net β cpm w/o ^3H	Net β μCi w/o ^3H	Net ^3H cpm	Net ^3H μCi
Door 133	18.4	9.0						
floor 133	18.4	14.2						
L.S.S. 133	18.4	12.2						
Hall Rm 133	18.4	9.2						
Hall Rm 132	18.4	13.4						
Hood 128	15.4	18.6						
Bench 128	15.4	16.0						
Refrig. Rm 128	15.4	15.6						
Hood (RH) Rm 236	15.4	17.2						
Sink 236	12.2	12.0						

* No smearing efficiency value is factored into these results.

Instrument used: _____

LLD(95%) = _____ cpm

LLD(β w/o ^3H) in μCi = _____ μCi

LLD(^3H) in μCi = _____ μCi

USE REVERSE SIDE FOR CALCULATIONS

REMOVABLE CONTAMINATION LEVELS (SMEARS)*

DAN Tullo
Surveyor

Periodic, Comprehensive Swipes of Rad Areas.
Purpose of Survey

8/14/81
Date

81-05

	1	2	3	4	5	6	7	8
Location	BKG	Gross β cpm w/ ^3H	Net β cpm w/ ^3H	Gross β cpm w/o ^3H	Net β cpm w/o ^3H	Net β μCi w/o ^3H	Net ^3H cpm	Net ^3H μCi
Rm 133 - Lss	16.8	10.4	0.0					
Rm 133 - floor	16.8	13.6	0.0					
Rm 133 - Refrig.	16.8	16.0	0.0					
Rm 130 - Hood	16.8	9.6	0.0					
Rm 130 - Sink	16.8	13.8	0.0					
Rm 130 - floor	16.8	16.0	0.0					
Rm 130 Refrig	16.8	8.8	0.0					
Rm 132 Hood	16.8	14.2	0.0					
Rm 132 floor	16.8	10.8	0.0					
Rm 134 floor	16.8	12.8	0.0					

* No smearing efficiency value is factored into these results.

Instrument used: AMC - 6FPC

$LLD_{(95\%)}$ = _____ cpm

$LLD_{(\beta\ w/o\ ^3H)}$ in μCi = _____ μCi

$LLD_{(^3H)}$ in μCi = _____ μCi

USE REVERSE SIDE FOR CALCULATIONS

PROGRAM #: 6
REGION A: LL-UL= 0- 12 LCR= 0 BKG= 0 % 2 SIGMA= 1.0
REGION B: LL-UL= 12- 156 LCR= 0 BKG= 0 % 2 SIGMA= 1.0
EFF=100.00 QIP= SIE/AEC SCR= B/A K= 1.000

Tullo Swipes 81-04

S#	TIME	CPMA/K DPM1/K	%DEV	CPMB/K DPM2/K	%DEV	QIP	FLAGS	SCR	MIN	
1	100.00	84	2.18	20	4.42	723.		.243	101	BLANK
		91		0				.000		
2	100.00	72	2.36	20	4.43	649.		.284	203	1 Rm 134, Bench
		79		0				.000		
3	100.00	75	2.30	21	4.36	649.		.280	304	2 Rm 132, hood
		82		0				.000		
4	100.00	55	2.69	20	4.44	535.	1	.367	405	3 Rm 132, sink
		62		0				.000		
5	100.00	72	2.36	20	4.48	639.		.278	506	4 Rm 132, floor
		79		0				.000		
6	100.00	70	2.39	20	4.53	619.		.279	607	5 Rm 130, sink
		77		0				.000		
7	100.00	64	2.50	20	4.46	583.	1	.316	708	6 Rm 130, hood
		70		0				.000		
8	100.00	63	2.51	21	4.39	578.		.328	809	7 Rm 130, floor
		70		0				.000		
9	100.00	52	2.77	19	4.57	528.	1	.366	910	8 Rm 133, LSS
		59		0				.000		
10	100.00	55	2.70	20	4.49	543.	1	.361	1011	9 Rm 133, floor
		61		0				.000		
11	100.00	61	2.57	20	4.51	572.	1	.325	1112	10 Hall outside 133
		67		0				.000		
12	100.00	77	2.28	21	4.41	657.	1	.269	1213	11 Rm 236, Refrig.
		84		0				.000		
13	100.00	68	2.42	26	3.95	606.	1	.376	1314	12 Rm 228, sm. Ref
		75		0				.000		
14	100.00	63	2.51	21	4.41	595.	1	.325	1415	13 Rm 228, Hood
		70		0				.000		
15	100.00	67	2.45	23	4.19	584.	1	.343	1516	14 Rm 228, Liq. closet
		73		0				.000		
16	100.00	61	2.56	25	3.96	564.		.417	1617	15 Rm 250 hood
		67		0				.000		
17	100.00	75	2.30	21	4.35	620.		.280	1718	16 Rm 190 Bench
		83		0				.000		
18	100.00	38	3.23	17	4.81	600.	1	.450	1819	17 Rm 190 Floor
		42		0				.000		

Don Tullo 4/6/81

DAN TULLO

RAM #: 6
ON A: LL-UL= 0- 12 LCR= 0 BKG= 0 % 2 SIGMA= 1.0
ON B: LL-UL= 12- 156 LCR= 0 BKG= 0 % 2 SIGMA= 1.0
= 100.00 QIP= SIE/AEC SCR= B/A K= 1.000

81-03

S#	TIME	CPMA/K DPM1/K	%DEV	CPMB/K DPM2/K	%DEV	QIP	FLAGS	SCR	MIN		
1	100.00	100	2.00	21	4.37	779.		.209	114	BKG	
		108		0				.000			
2	100.00	98	2.02	19	4.64	750.		.188	215	Rm 133 LSS.	
		106		0				.000			
3	100.00	97	2.04	20	4.53	722.		.202	316	Rm 133 Doorway	
		105		0				.000			
4	100.00	83	2.19	18	4.67	698.		.220	417	134	Microcosm
		91		0				.000			
5	100.00	84	2.18	18	4.66	727.		.220	518	134	Balance Area
		91		0				.000			
6	100.00	84	2.18	18	4.72	716.		.212	619	132	Hood
		91		0				.000			
7	100.00	73	2.34	18	4.74	709.		.244	720	132	Sink
		79		0				.000			
8	100.00	85	2.16	19	4.64	724.		.218	821	130	Balance Area
		92		0				.000			
9	100.00	93	2.07	21	4.41	724.		.220	922	130	sink
		101		0				.000			
10	100.00	95	2.05	19	4.53	746.		.205	1023	Hall 130	
		102		0				.000			
11	100.00	75	2.31	17	4.86	775.		.226	1124	Hall 133	
		81		0				.000			
12	100.00	96	2.04	19	4.55	763.		.202	1225	236	Hood (left)
		103		0				.000			
13	100.00	75	2.31	17	4.83	748.		.230	1326	236	Hood (right)
		81		0				.000			
14	100.00	92	2.09	19	4.64	733.		.202	1427	236	Sink (center)
		99		0				.000			
15	100.00	95	2.06	19	4.64	788.		.197	1528	LSS center room	
		102		0				.000			
16	100.00	72	2.35	17	4.87	757.		.234	1629	Floor center room	
		78		0				.000			
17	100.00	43	3.06	14	5.31	752.		.333	1730	228	Hood & Refrig. la-
		46		0				.000			
18	100.00	40	3.17	14	5.31	728.		.357	1831	228	Hood Left
		43		0				.000			
19	100.00	72	2.36	17	4.82	721.		.240	1932	228	refrig - sink (Lt)
		77		0				.000			
20	100.00	85	2.17	19	4.54	726.		.229	2033	228	Floor - Sink
		92		0				.000			
21	100.00	20	4.44	13	5.64	762.		.620	2135	236	Hallway
		22		0				.000			
22	100.00	65	2.49	17	4.81	768.		.268	2236	228	Hallway
		70		0				.000			
23	100.00	34	3.44	16	5.06	746.		.463	2337	250	Hood
		36		0				.000			
24	100.00	44	3.00	16	5.01	743.		.359	2438	250	refrig.
		48		0				.000			
25	100.00	62	2.55	16	4.95	766.		.264	2539	246	Balance
		66		0				.000			

Dan Tullo

[signature] 4/14/81

81-02

```
#  6
A  LL-UL=   0- 12  LCR=  0  BKG=  0  % 2 SIGMA= 1.0
B  LL-UL=  12- 156 LCR=  0  BKG=  0  % 2 SIGMA= 1.0
20.00 QIP= SIE/AEC SCR= B/A  K= 1.000
```

#	TIME	CPMA/K DPM1/K	%DEV	CPMB/K DPM2/K	%DEV	QIP	FLAGS	SCR	MIN	
1	20.00	16	11.2	12	12.7	807.		.787	21	BK6
		17		0			?	.000		
2	20.00	12	13.1	11	13.3	739.		.974	42	24 Rm236 floor (Door)
		12		0				.000		
3	20.00	13	12.6	14	11.8	729.		1.139	63	23 Rm236 refrig
		14		0				.000		
4	20.00	12	13.1	12	13.0	727.		1.026	84	22 Rm236 Hood Area
		12		0				.000		
5	20.00	10	14.0	10	14.4	739.		.941	105	21 Rm236 Sink Area
		11		0				.000		
6	20.00	13	12.2	12	12.9	732.		.888	125	20 Hall outside 236
		14		0				.000		
7	20.00	11	13.2	12	12.8	758.		1.061	146	19 LSS 228
		12		0				.000		
8	20.00	17	10.7	10	14.0	751.		.586	167	18 Rm 228 Hood Area
		19		0				.000		
9	20.00	11	13.2	13	12.3	702.		1.149	188	17 Rm228 Door Area
		12		0				.000		
10	20.00	47	6.49	13	12.3	740.		.278	209	16 floor LSS Rm (228)
		51		0				.000		
11	20.00	13	12.2	13	12.4	757.		.974	230	15 Rm 236 Hood Area
		14		0				.000		
12	20.00	10	13.8	11	13.5	743.		1.053	251	14 Rm 236 floor
		11		0				.000		
13	20.00	12	12.7	11	13.5	754.		.882	272	13 LSS Rm 133
		13		0				.000		
14	20.00	12	12.6	11	13.6	752.		.859	293	12 11 Rm 133 Doorway
		13		0				.000		
15	20.00	17	10.9	11	13.6	752.		.650	313	11 10 Hall outside 130
		18		0				.000		
16	20.00	17	10.9	17	10.7	720.		1.039	334	10 9 Rm 130 Sink Area
		18		0				.000		
17	20.00	— 52	6.21	17	10.9	732.		.319	355	9 8 Rm 130 Hood Area
		56		0				.000		
18	20.00	— 38	7.28	16	11.2	690.		.416	376	8 7 Rm 130 floor
		41		0				.000		
19	20.00	18	10.5	14	12.0	694.		.757	397	7 6 Rm 132 hood
		20		0				.000		
20	20.00	12	12.9	12	12.8	719.		1.008	418	6 5 Rm 132 floor by sink
		13		0				.000		
21	20.00	39	7.17	16	11.2	714.		.405	439	5 4 Rm 132 floor by door
		42		0				.000		
22	20.00	30	8.20	15	11.4	721.		.511	460	4 3 Hall outside 134
		32		0				.000		
23	20.00	17	10.9	14	12.0	690.		.825	480	2 Rm 134 floor
		18		0				.000		
24	20.00	25	8.99	15	11.5	677.		.608	501	1 Rm 134 floor
		27		0				.000		

U.S. Environmental Protection Agency
Western Ecology Division

NRC Radioactive Materials License No. 36-12343-02 Termination and Facility Decommissioning

Date: **November 27, 2004**
Subject: **Room Survey: Main Building 134 Final Contamination Survey.**

Description and Historic Use:

Double lab (450 ft^2). Carbon-14 tracers were used in the late 1970's – early 1980's and again in early 1990's. This room was decommissioned as an unrestricted area on April 9, 1996. No isotope use since1995.

Surveys:

Total (fixed + removable) and removable contamination survey were conducted in MB 134 at the time of restricted use decommissioning. All points surveyed demonstrated no significant contamination. This area meets the contamination criteria for unrestricted use based upon the isotopes used at our facilities. A HVAC duct swipe was made in November 2004 which detected 0.23 Bq/100 cm^2 of carbon-14.

Records for this room clearly demonstrate that contamination surveys were regularly performed, the area was not subject to any significant contamination events, and the room was maintained as a contaminate-free area. We determined it was unnecessary to conduct further contamination surveys in this area given these survey results and the Western Ecology Division's historic management of radioactive material use in this area. Records of the most recent historic surveys (i.e. prior to the final decommissioning surveys) of MB 134 are included in this report.

The survey for total contamination was conducted using a Ludlum Model 3 Survey Meter equipped with a Ludlum Model 44-9, 12-cm^2 thin-window Geiger-Muller pancake detector. Removable contamination was determined using methanol-wetted swipes counted in a Packard 2200 CA dual channel Liquid Scintillation Counter.

DYNAMAC CORPORATION
200 SW 35th Street, Corvallis, OR 97333

MEMORANDUM

TO: Jay Gile
FROM: Phil Monaco
DATE: April 9, 1996

SUBJECT: Decommissioning of MB 134

The microcosm room (MB134) is free of all radioactive materials. Equipment used in the PCP and TCE carbon-14 projects has been decontaminated and in many cases removed from the room. The microcosm boxes were survey for removable and fixed contamination. The microcosm effluent vents were also surveyed for removable contamination as were the room walls and floor. Given the projected use of MB134 and its present "clean" state, I recommend that the room be declared as "decommissioned" and all radioactive materials signs removed.

The results of the surveys are summarized below.

Fixed Contamination Survey (96-05 and 96-09)
Ludlum #3 S/N 77146

Survey Description	CPM	Activity (pCi/100cm²)
Background	125	0
Microcosm A-2		
Outside chamber walls	<LLD*	0 net
Inside chamber walls	<LLD	0 net
Exposure Tank (Glass)	<LLD	0 net
Precision Water bath	<LLD	0 net
Microcosm C-2		
Outside chamber walls	<LLD	0 net
Inside chamber walls	<LLD	0 net
Rack	<LLD	0 net
Bricks	<LLD	0 net
Water float	<LLD	0 net
Bottom	<LLD	0 net
Floor	<LLD	0 net
Floor	<LLD	0 net
Table (grey)	<LLD	0 net
Room		
N. Wall	<LLD	0 NET
S. Wall	<LLD	0 NET
E. Wall	<LLD	0 NET
W. Wall	<LLD	0 NET
Sink counter top	<LLD	0 NET

Survey Description	CPM	Activity (pCi/20 cm²)
Room (cont'd)		
Floor (sink area)	<LLD	0 NET
N. Floor	<LLD	0 NET
S. Floor	<LLD	0 NET
E. Floor	<LLD	0 NET
W. Floor	<LLD	0 NET

LLD= Lower Limits of Detection at the 95% confidence level as calculated by the formula: $125 + \left[\left(\frac{\sqrt{125 \cdot 1}}{1}\right) 2.96\right] = 158$ cpm

Removable Contamination (96-06, 96-07, and 96-08).

Packard LSC 2200 CA S/N 036755

Survey Description (per 100 cm²)	CPM (gross)	DPM (net)	Activity (pCi)
N Wall	23	<LLD**	0
S Wall	23	<LLD	0
E Wall	17	<LLD	0
W Wall	12	<LLD	0
Sink Counter	17	<LLD	0
Floor (sink area)	18	<LLD	0
N. Floor	20	<LLD	0
S Floor	18	<LLD	0
E Floor	25	<LLD	0
W Floor	17	<LLD	0
microcosom C-3 exit pipe	22	<LLD***	0
microcosom C-2 exit filter box	19	<LLD	0
microcosom C-1 exit filter box	16	<LLD	0
microcosom C-1 exit pipe	23	<LLD	0
microcosom B-1 exit filter box	28	12	5
microcosom B-2 exit filter box	22	<LLD	0
microcosom A-1 exit filter box	17	<LLD	0
microcosom A-2 exit filter box	29	14	6
MICRICOSOM A-2			
outside walls	18	<LLD****	0
inside walls	24	<LLD	0
glass chamber outside walls	19	<LLD	0
glass chamber inside walls	19	<LLD	0
glass chamber lid	22	<LLD	0
Precision water bath outside	30	<LLD	0
Precesion water bath inside	16	<LLD	0

Survey Description (per 100 cm^2)	CPM (gross)	DPM (net)	Activity (pCi)
MICROCOSOM C-2			
outside walls	22	<LLD	0
inside bottom	17	<LLD	0
inside walls	17	<LLD	0
water float	16	<LLD	0
rack inside	13	<LLD	0
table	18	<LLD	0
floor	17	<LLD	0
Room door	21	<LLD	0

**LLD_{95}= Lower Limits of Detection at the 95% confidence level as calculated by the formula:

$$19 + \left[\left(\frac{\sqrt{19 \cdot 2'}}{2'}\right) 2.96\right] = 28 \text{ cpm}$$

***LLD_{95}= Lower Limits of Detection at the 95% confidence level as calculated by the formula:

$$36 + \left[\left(\frac{\sqrt{(17.3 \text{cpm} \cdot 3')}}{2'}\right) 2.96\right] = 46 \text{ cpm}$$

****LLD_{95}= Lower Limits of Detection at the 95% confidence level as calculated by the formula:

$$22\text{cpm} + \left[\left(\frac{\sqrt{22 \text{cpm} \cdot 2'}}{2'}\right) 2.96\right] = 32 \text{ cpm}$$

U.S EPA
ENVIRONMENTAL RESEARCH LABORATORY -CORVALLIS

Log No. 96-09

RADIATION CONTAMINATION SURVEY

Date: 4-4-96 Type of Survey: FIXED CONTAMINATION

Isotope(s): β, γ

Gross Background Counts: 125 ± CPM Total Count Time (min.): 1

Lower Limits of Detection: (√125) 2.96 = 33 + 125 = 158 CPM cpm

Instrument Used: ☐ GFPC ☐ LSC ☒ GM ☐ Ion Chamber ☐ Scintillation Model: Ludlum #3 S/N: 77146

Background: 125 ± 33 CPM±SD DPM±SD Standard (Cs 137 √ source 11,000 cpm √ ok): % Err

Swipe No.	Room No.	Swipe Description	Nuclide: per 100 cm² CPM±SD	Net DPM	Net Activity	Nuclide: per 100 cm² CPM±SD	Net DPM	Net Act
01	MB134	N WALL	Ø net	<LLD	Ø net			
		S WALL	↓	↓	↓			
		E WALL	↓	↓	↓			
		W WALL	↓	↓	↓			
		Sink counter	↓	↓	↓			
		Floor (sink area)	↓	↓	↓			
		N Floor	↓	↓	↓			
		S Floor	↓	↓	↓			
		E Floor	↓	↓	↓			
		W Floor	↓	↓	↓			

Comments:

[signature], 4-4-96
Radiation Safety Date

(9/90)

U.S EPA
ENVIRONMENTAL RESEARCH LABORATORY -CORVALLIS

RADIATION CONTAMINATION SURVEY

Log No. 96-08 1/2

Date: 4-4-96 Type of Survey: REMOVABLE CONTAMINATION

Isotope(s): P

Gross Background Counts: ~~10~~ 19 ± CPM Total Count Time (min.): 2

Lower Limits of Detection: $19 + \sqrt{(19)2}/2)2.96 = 28$ cpm cpm

Instrument Used: ☐ GFPC ☒ LSC ☐ GM ☐ Ion Chamber ☐ Scintillation Model: PACKARD 2200 CA S/N: 036755

Background: 19 CPM±SD 21 DPM±SD Standard (NEW ^{14}C 84,000 dpm 4-14-76 = 83,711 dpm ~~1 Effic~~

Swipe No.	Room No.	Swipe Description	Nuclide: P per 100 cm² CPM±SD	Net DPM	Net Activity	Nuclide: per 100 cm² CPM±SD	Net DPM	Net Activit
2	MB134	N WALL	23	24DPS	Ø net			
		S WALL	23					
		E WALL	17					
		W WALL	12					
		Sink counter	17					
		Floor (sink area)	18					
		N Floor	20					
		S Floor	18					
		E Floor	25					
		W Floor	17					
	MB236	Hood SASH	22					
		" Sill	25					
		Floor by N hood	23					
		Floor by Sink	21					
		Sink	17					
		DOOR	19					
	MB270	Hood SASH/SILL	22					
		Floor by hood	25					
		Counter opp hood	9					
		Floor (counter)	18					

Comments:

QA. Moore 4/8/96
Radiation Safety Date

(9/90)

U.S EPA
ENVIRONMENTAL RESEARCH LABORATORY -CORVALLIS

Log No. 96-07

RADIATION CONTAMINATION SURVEY Microcosm Rm MB 134

Date: 4-2-96 Type of Survey: REMOVABLE CONTAMINATION

Isotope(s): ^{14}C

Gross Background Counts: 51 ± CPM Total Count Time (min.): 3

Lower Limits of Detection: $[(\sqrt{51}/3)2.96] + 17 = 24$ CPM cpm

Instrument Used: ☐ GFPC ☑ LSC ☐ GM ☐ Ion Chamber ☐ Scintillation Model: Packard 2200 CA S/N: 036755

Background: 24 LLD_{95} CPM±SD 19 DPM±SD Standard {NEN 84,000 ^{14}C 7-14-76 = 84,740} dpm

Swipe No.	Room No.	Swipe Description	Nuclide: ____ per 100 cm² CPM±SD	Net DPM	Net Activity	Nuclide: ____ per 100 cm² CPM±SD	Net DPM	Net Activity
2	134	Microcosm C-3 EXIT PIPE	22	LLD_{95}	0 net			
3		" C-2 EXIT FILTER	19	↓	↓			
4		C-1 EXIT FILTER	16					
5		C-1 EXIT PIPE	23	↓	↓			
6		B-1 EXIT FILTER box	28	~~12~~ 14	5.4 pCi			
7		B-2 EXIT FILTER box	22	LLD_{95}	0 net			
8		A-1 EXIT FILTER box	17	↓	↓			
9		A2 EXIT FILTER box	29	~~14~~ 14	6.3 pCi			

Comments:

Radiation Safety / Date

(9/90)

Protocol #:28 [illegible] fety [illegible] 2-Apr-96 19:05
Region A: LL-UL= 0.0-[illegible] [illegible] 0 Bkg= 0.00 [illegible] Sigma=2.00
Region B: LL-UL= 4.0-156; Lcr= 0 Bkg= 0.00 %2 Sigma=5.00
Region C: LL-UL= 0.0- 0.0 Lcr= 0 Bkg= 0.00 %2 Sigma=0.00
Time = 3.00 QIP = tSIE ES Terminator = Count
14C.QuenchCurve
Conventional DPM
Nuclide 1 = 113700
Luminescence Correction On

	S#	TIME	CPMA	DPM1	A:2S%	CPMB	B:2S%	SIS	tSIE	FLAG	LUM	
A	1	3.00	36.00	44.70	30.54	23.00	24.07	72.400	137.		43	BLANK
	2	3.00	34.33	42.76	25.39	27.33	22.08	81.380	136.		28	D-2
	3	3.00	39.33	49.17	21.57	28.33	21.69	97.970	134.		14	D-3
	4	3.00	29.33	36.68	26.69	22.67	24.25	90.370	134.		23	D-4
	5	3.00	15.33	15.71	34.23	13.00	32.02	100.79	965.	E	19	BKGROUND
	6	0.13	82738.5	84740.3	1.92	80369.2	1.95	160.38	975.	E	0	14C NEW 84 ...
	(6 missing vials)											
B	13	3.00	17.33	19.16	32.17	11.67	33.80	59.690	265.		9	BLANK
	14	3.00	22.00	24.67	27.77	17.33	27.73	78.520	238.		11	2
	15	3.00	19.00	21.22	31.57	14.67	30.15	105.39	246.		10	3
	16	3.00	15.67	17.50	34.30	14.33	30.49	101.28	245.		18	4
	17	3.00	23.33	26.23	27.10	20.33	25.60	86.210	234.		13	5
	18	3.00	27.67	31.12	26.28	22.67	24.25	69.200	233.		16	6
	19	3.00	21.67	24.31	28.36	17.33	27.73	81.870	238.		8	7
	20	3.00	16.67	18.58	37.09	15.67	29.17	74.370	249.		25	8
	21	3.00	28.67	32.56	23.71	23.67	23.73	78.190	218.		8	9
	(9 missing vials)											
	31	3.00	128.00	135.96	10.39	120.00	10.54	97.270	536.		1	14C stds
	32	3.00	1167.33	1233.22	3.38	1118.00	3.45	108.51	587.		0	
	33	1.01	9937.62	10509.2	1.99	9519.80	2.03	107.65	578.		0	
	34	0.12	90691.7	95825.6	1.91	87191.7	1.95	108.47	586.		0	

(Margin notes: samples 1–6 "CH_3CN Distilled WASTE"; samples 13–21 "MB 134 Microcosms")

A CH_3CN Distilled WASTE

LLD95 $\left[\left(\frac{\sqrt{36 \cdot 3}}{3}\right)2.96\right] + 36 = 46$ cpm

WASTE	Gross cpm	DPM	... 0.5 ml
D-2	34 cpm	< LLD95	0 pm
D-3	39	< LLD95	0 pm
D-4	29	< LLD95	0 pm

B Microcosm Room MB 134

LLD95

$\left[\left(\frac{\sqrt{(17)3}}{3}\right)2.96\right] + 17 = 24$ cpm

U.S EPA
ENVIRONMENTAL RESEARCH LABORATORY -CORVALLIS

Log No. 96-06

RADIATION CONTAMINATION SURVEY

Date: 4/1/96 Type of Survey: Removable Contamination

Isotope(s): β (^{14}C)

Gross Background Counts: 44 ± CPM Total Count Time (min.): 2'

Lower Limits of Detection: $(\sqrt{44}/2)2.96 = 10$ CPM LLD = 22/10 = 32 DPM cpm

Instrument Used: ☐ GFPC ☐ LSC ☐ Ion Chamber ☐ Scintillation ☒ ~~GM~~ Model: Packard 2200CA S/N: 036755

Background: CPM±SD DPM±SD Standard (NEN ^{14}C 84,000 dpm ± 83,648 dpm ~~2-Error~~

Swipe No.	Room No.	Swipe Description	Nuclide: per 100 cm² Gross CPM±SD	Net DPM	Net Activity	Nuclide: per 100 cm² CPM±SD	Net DPM	Net Activity
		MICROCOSOM A2						
2	134	Outside	18	LLD 35	Ø net			
3		Outside Chamber (TANK)	19					
4		Inside Chamber (TANK)	19					
5		~~Out~~ Inside MICROCOSOM	24					
6		Tank lid	22					
7		PRECISION WATER BATH outside	30					
8		PRECISION WATER BATH INSIDE	16					
		MICROCOSOM C2						
9		Outside	22		Ø net			
10		Inside bottom	17					
11		Inside	17					
12		Water Float	16					
13		Rack	13					
14		Table	18					
15		Floor	17					
~~16~~		Floor						
~~16~~		Door	21		Ø net			

Comments:

Radiation Safety 4/2/96 Date

(9/90)

U.S EPA
ENVIRONMENTAL RESEARCH LABORATORY -CORVALLIS

Log No. _____

RADIATION CONTAMINATION SURVEY

Date: 4-1-96 Type of Survey: FIXED CONTAMINATION

Isotope(s): P

Gross Background Counts: 125 ± CPM Total Count Time (min.): 1

Lower Limits of Detection: $(\sqrt{125})2.96 = 33+125 =$ 158 CPM . cpm

Instrument Used: ☐ GFPC ☐ LSC ☒ GM ☐ Ion Chamber ☐ Scintillation Model: Ludlum #3 S/N: 77146

Background: 125 CPM±SD DPM±SD Standard (Cs^{137}, 11,000 cpm): % Error

Swipe No.	Room No.	Swipe Description	Nuclide: per 100 cm² CPM±SD	Net DPM	Net Activity	Nuclide: per 100 cm² CPM±SD	Net DPM	Net Activity
1111	134	Microcosm A2	~~background~~	LLD				
		Outside	0 net					
		Inside	0 net					
		Exposure Tank	0 net					
		WATER PRECISION BATH	0 net					
1111	1111	MICROSOM C2	~~background~~	LLD				
		outside	0 net					
		inside						
		Rack						
		Bricks						
		water Float						
		Bottom						
		Floor						
		Floor						
		Table (grey)						

Comments: Room 134 clean up

Radiation Safety 4/1/96 Date

(9/90)

134

U.S EPA
ENVIRONMENTAL RESEARCH LABORATORY -CORVALLIS

Log No. 96-1 1/3

RADIATION CONTAMINATION SURVEY

Date: 1/3/96 Type of Survey: REMOVABLE CONTAMINATION

Isotope(s): P

Gross Background Counts: 25 ± CPM Total Count Time (min.): 2'

Lower Limits of Detection: $(\sqrt{50/2})\,2.96 \approx 11$ dpm

Instrument Used: ☐ SFPC ☑ LSC ☐ GM ☐ Ion Chamber ☐ Scintillation Model: Packard 2200 CA S/N: ~~E~~ 036755

Background: CPM±SD DPM±SD Standard ~~P32~~ NEW ^{14}C 84,000 dpm =): 85,035 dpm ✓ Error

Swipe No.	Room No.	Swipe Description	Nuclide: P per 100 cm² 85 CPM±SD net	Net DPM	Net Activity	Nuclide: per 100 cm² CPM±SD	Net DPM	Net Activity
2	134	Microcosm door A-2	Ø	Ø net	Ø net			
		floor area	Ø	↓	↓			
		Microcosm door L-2	Ø	↓	↓			
5		floor area	2	LLD	Ø net			
		room door	Ø	Ø net	Ø net			
	236	S HOOD SASH/SILL	Ø					
		S. HOOD FLOOR area	Ø					
		SINK	Ø					
10		N HOOD SASH/SILL	Ø		↓			
		N. HOOD FLOOR AREA	75	84	38 dpm	* Note:		
		desk	Ø		Ø net			
		door	Ø					
	256	Hood SASH/SILL	Ø					
15		FLOOR	Ø					
		OXIDIZER	Ø					
		Counter by phone	Ø					
		LSC	Ø					
		Desk	Ø					
20		door	Ø	↓	↓			
	266	Hood SASH/SILL	Ø					

Comments: * Note. Decontaminated 1/5/96 & reswiped see following.

P. Monn 1/5/95
Radiation Safety Date

P. Monn

(900)

U.S EPA
ENVIRONMENTAL RESEARCH LABORATORY -CORVALLIS

Log No. 93-16 1/2

RADIATION CONTAMINATION SURVEY

Date: 11-5-93 Type of Survey: REMOVABLE CONTAMINATION

Isotope(s): β

Gross Background Counts: 292 ± CPM Total Count Time (min.): 10

Lower Limits of Detection: √292/10 × 2.96 = 51 = cpm

Instrument Used: ☐ GFPC ☐ LSC ☐ GM ☐ Ion Chamber ☐ Scintillation Model: PIC 2200CA S/N:

3H 70791/113688 dpm = 62

Background: 29.2 CPM±SD DPM±SD Standard 14C [NE] 84000 dpm 83270 cpm/84000 dpm) : = 99 Eff

Swipe No.	Room No.	Swipe Description	Nuclide: net per 100 cm² CPM±SD	Net DPM	pCi Net Activity	Nuclide: per 100 cm² CPM±SD	Net DPM	Net Activity
2	256	hood	0	0	0			
		oxidizer	0	↓	↓			
		Phone	0	↓	↓			
5		LSC/computer	0	↓	↓			
		door	8	9	4			
	266	hood	1	<LLD95	0			
		Floor	0	0	↓			
		Phone	7	8	4			
10		door	6	6	3			
	270	hood	16	17	8			
		floor	15	16	7			
		counter	5	<LLD95	0			
		Phone	13	14	6			
15		door	2	<LLD95	0			
	236	S. hood	0	0	0			
		Floor by hood	5	<LLD95	0			
		Phone	9	9	4			
		Floor by N. hood	11	12	5			
20		door	0	0	0			
	130	floor by hood	8	9	4			

Comments: All swipes less than 100 dpm/100 cm². No further action necessary or warranted.

[signature] 11/8/93
Radiation Safety Date

U.S EPA
ENVIRONMENTAL RESEARCH LABORATORY -CORVALLIS

Log No. _____ 2/2

RADIATION CONTAMINATION SURVEY

: _____ Type of Survey: _____

Isotope(s): _____

Gross Background Counts: _____ ± _____ CPM Total Count Time (min.): _____

Lower Limits of Detection: _____ = _____ cpm

Instrument Used: ☐ GFPC ☐ LSC ☐ GM ☐ Ion Chamber ☐ Scintillation Model: _____ S/N: _____

Background: _____ CPM±SD _____ DPM±SD Standard (_____): _____ % Error

Swipe No.	Room No.	Swipe Description	Nuclide: _____ per 100 cm² CPM±SD	Net DPM	Net Activity	Nuclide: _____ per 100 cm² CPM±SD	Net DPM	Net Activity
22	130	Phone	0	0	Ø			
		door	3	<LLD95				
	134	Cosam	0	0				
25		Floom	0	0				
		Table	0	0				
		door	2	<LLD95	↓			
	190	door	8	9	4			
		floor	0	<LLD95	Ø			
30		Counter S	3	<LLD95	Ø			
31		Phone	10	11	5			
		^{3}H PIC 113,698 DPM	70791CPM/113688 DPM		= 62 % eff			
		^{14}C MIN 84,000 DPM	83270 CPM/84000 DPM		= 99 % eff			

nts:

1
Radiation Safety Date

(9/70)

U.S. Environmental Protection Agency
Western Ecology Division

NRC Radioactive Materials License No. 36-12343-02 Termination and Facility Decommissioning

Date: **November 27, 2004**
Subject: **Room Survey: Main Building 138 Final Contamination Survey.**

Description and Historic Use:

Double lab (450 ft^2). Carbon-14 and potentially Hydrogen-3 tracers. No isotope use since 1990.

Surveys:

Total (fixed + removable) and removable contamination surveys were conducted in MB 138 in November 2004. All points surveyed (12 total and 12 removable) demonstrated no significant contamination. Six points indicated very low levels of removable contamination from tritium (0.22 – 0.36 Bq/100 cm^2). All other sampling points were at background. This area meets the contamination criteria for unrestricted use based upon the isotopes used at our facilities. A HVAC duct swipe was also made which detected 1.48 and 0.55 Bq/100 cm^2 of hydrogen-3 and carbon-14 respectively.

Records for this room clearly demonstrate that contamination surveys were regularly performed, the area was not subject to any significant contamination events, and the room was maintained as a contaminate-free area. We determined it was unnecessary to conduct further contamination surveys in this area given these survey results and the Western Ecology Division's historic management of radioactive material use in this area. Records of the most recent historic surveys (i.e. prior to the final decommissioning surveys) of MB 138 are included in this report.

The survey for total contamination was conducted using a Ludlum Model 2000 Scaler equipped with a Ludlum Model 44-9, 12-cm^2 thin-window Geiger-Muller pancake detector. Removable contamination was determined using methanol-wetted swipes counted in a Packard 2200 CA dual channel Liquid Scintillation Counter.

NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY

FIXED SURVEY

DATE 11-11-04 LOCATION MB ROOM 138

INSTRUMENT Ludlum 2000 Scaler Pancake Probe 44-9

SERIAL NO. 83810 / PR070834

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
1	26	LLD95	NA
2	42		
3	24		
4	38		
5	28		
6	35		
7	42		
8	24		
9	40		
10	44		
11	30		
12	30		

$LLD_{95} = \left\{\left(\frac{\sqrt{38}}{0.5}\right) \times 2.96\right\}^2 = 113$ CPM

BACKGROUND STANDARD (^{14}C 0.1 µCi) 76 CPM / 10540 CPM

2.8% eff.

Time 0.5'

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²

$LLD_{95} = \left\{\left(\frac{\quad}{\quad}\right) \times 2.96\right\}^2 + \quad = \quad$ CPM

BACKGROUND STANDARD ( ) _____

COMMENTS:

RADIATION SPCL.

11-16-04

DATE

NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY

DATE 11-11-04 LOCATION MD ROOM 138

INSTRUMENT Packard 2200CA LSC

SERIAL NO. ~~Q397615~~ Q36755

^{3}H

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
1	5	<LLD95	ND
2	6	<LLD95	ND
3	7	15	0.25
4	5	<LLD95	ND
5	8	17	0.28
6	4	<LLD95	ND
7	7	14	0.23
8	7	13	0.22
9	10	22	0.36
10	6	<LLD95	ND
11	4	<LLD95	ND
12	9	22	0.36

$LLD_{95} = \left\{\left(\frac{\sqrt{12}}{3}\right) \times 2.96\right\}^{4/4} =$ 7 CPM

BACKGROUND STANDARD (^{3}H 64,175 DPM) 4 CPM = 56,056 DPM

87% eff.

^{14}C

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
	18	<LLD95	ND
	14		
	13		
	13		
	14		
	14		
	17		
	13		
	19		
	11		
	12		
	9		

$LLD_{95} = \left\{\left(\frac{\sqrt{66}}{3}\right) \times 2.96\right\}^{22/4} =$ 30 CPM

BACKGROUND STANDARD (^{14}C 84,000 DPM) 22 CPM = 85,603 DPM

102% eff.

COMMENTS:

Q. Moran
RADIATION SPCL.

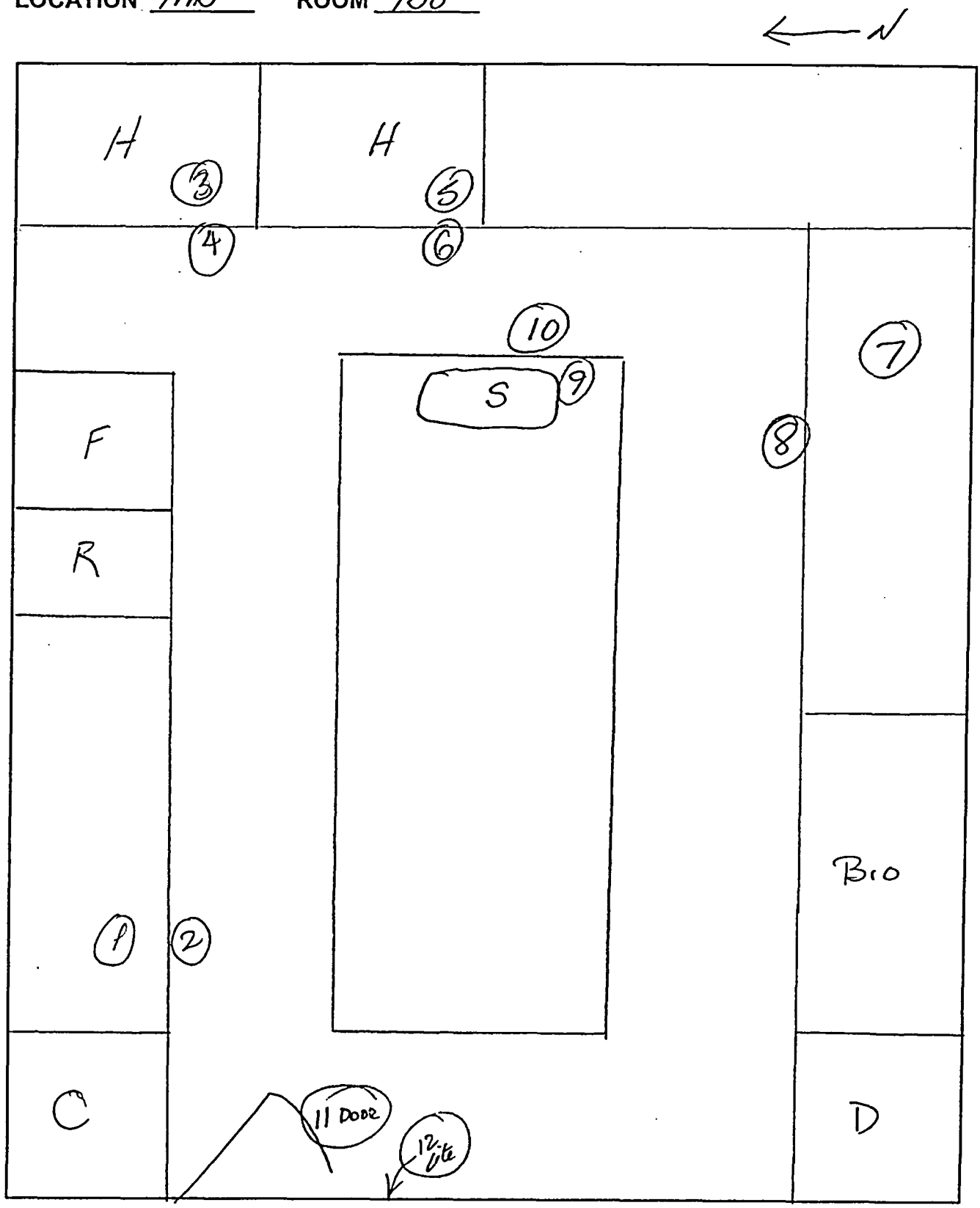
11-18-04
DATE

NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY MAP

LOCATION MB ROOM 138



U.S EPA
ENVIRONMENTAL RESEARCH LABORATORY -CORVALLIS

Log No. 90-40 1/3

RADIATION CONTAMINATION SURVEY

Date: 12-3-90 Type of Survey: Non-Removable Contamination

Isotope(s): β & γ

Gross Background Counts: ____ ± ____ CPM Total Count Time (min.): ____

Lower Limits of Detection: $\sqrt{75} \times 4.66 = 40.4$ = 40.4 cpm

Instrument Used: ☒ GFPC ☐ LSC ☐ GM ☐ Ion Chamber ☐ Scintillation Model: Ludlum #3 S/N: 77222

Background: 75 CPM±SD ____ DPM±SD Standard (^{137}CS ≅ 1 μCi / 11k cpm): 11,025 cpm % Error

Swipe No.	Room No.	Swipe Description	Nuclide: ____ per 100 cm² net CPM±SD	Net DPM	Net Activity	Nuclide: ____ per 100 cm² CPM±SD	Net DPM	Net Activity
	138 MB	Hoods	Ø					
		Sink	Ø					
		Floor	Ø					
		Desk	Ø					
		Door	Ø					
	132	Hoods	Ø					
		Sink	Ø					
		Floor	Ø					
		Bench	Ø					
		door	Ø					
	258	Hood Ft. wall	450*					
		Floor	Ø					
		Sinks	Ø					
		Door	Ø					
	256	Hood	Ø					
		Floor	Ø					
		Phone	Ø					
		door	Ø					

*: * will label this non-removable contamination

Radiation Safety 12/3/90 Date

(9/90)

U.S EPA
ENVIRONMENTAL RESEARCH LABORATORY -CORVALLIS

Log No. _____ 2/3

RADIATION CONTAMINATION SURVEY

Date: _____ Type of Survey: _____

Isotope(s): _____

Gross Background Counts: _____ ± _____ CPM Total Count Time (min.): _____

Lower Limits of Detection: _____ = _____ cpm

Instrument Used: ☐ GFPC ☐ LSC ☐ GM ☐ Ion Chamber ☐ Scintillation Model: _____ S/N: _____

Background: _____ CPM±SD _____ DPM±SD Standard (_____): _____ % Error

Wipe No.	Room No.	Swipe Description	Nuclide: _____ per 100 cm² net CPM±SD	Net DPM	Net Activity	Nuclide: _____ per 100 cm² CPM±SD	Net DPM	Net Activity
	236	S. Hood	Ø					
		Floor	Ø					
		SINK	Ø					
		door	Ø					
		N. Hood	Ø					
	232B	SINK	Ø					
		Phone	Ø					
		Floor	Ø					
		Counter	Ø					
	228	S. Hood	Ø					
		Floor	Ø					
		door	Ø					
		SINK	Ø					
		N. Hood	Ø					
	236P	Phob lab. -SINK	Ø					
		Floor	Ø					
		Counter	Ø					
	294	N. Hood	Ø					
		Floor	Ø					
		SINK	Ø					

_____ /

Radiation Safety Date

(9/80)

U.S EPA
ENVIRONMENTAL RESEARCH LABORATORY -CORVALLIS

RADIATION CONTAMINATION SURVEY

Log No. _____ 3/3

_____ Type of Survey: _____

Isotope(s): _____

oss Background Counts: _____ ± _____ CPM Total Count Time (min.): _____

er Limits of Detection: _____ = _____ cpm

trument Used: ☐ GFPC ☐ LSC ☐ Ion Chamber ☐ GM ☐ Scintillation Model: _____ S/N: _____

kground: _____ CPM±SD _____ DPM±SD Standard (_____): _____ % Error

pe	Room No.	Swipe Description	Nuclide: _____ per 100 cm²			Nuclide: _____ per 100 cm²		
			Net CPM±SD	Net DPM	Net Activity	CPM±SD	Net DPM	Net Activity
	294	S. Hood	Ø					
	C-1	door	Ø					
		Floor	Ø					
	NERF	Rad Lab Hood	Ø					
		Floor	Ø					
		Bench	Ø					
		door	Ø					

_____ / _____
Radiation Safety Date

(9/80)

7

AREA CONTAMINATION SURVEY SHEET

Radionuclide(s) Surveyed: ^{14}C, ^{3}H Date: _____

Method of Detection: _____

_____
Radiation Safety Technician

Swipe #	Location RM #	Area	Nuclide: ^{3}H NET CPM	NET DPM	µCi	Nuclide: ^{14}C NET CPM	NET DPM	µCi
11	138	Bkgrd	0	N/A	N/A	0	N/A	N/A
12		Hood Floor	0	N/A		2	< LLD	
13		Hood Floor	0	N/A		2	< LLD	
14		N Floor	0	N/A		1	< LLD	
15		Hood Sash	1	< LLD_{95}		0	N/A	
16		Hood Sill	1	< LLD		2	< LLD	
17		E Counter	0	N/A		1	< LLD	
18		Phone	0	N/A		0	N/A	
19		Door	0	N/A		1	< LLD	
20	258	Hood Sash	2	< LLD		0	N/A	↓
21		Sill	0	N/A		5	6	2.7
22		Floor	0	N/A		6	9	4
23		Floor	0	N/A		0	N/A	N/A
24		Door	0	N/A		1	< LLD	N/A
25		LSC	1	<	↓	2	< LLD	N/A

Calculation of Lower Limits of Detection (LLD) Nuclide: _____ Nuclide: _____

Gross Background Counts: _____ _____
Total Background Count time: _____ _____

$$LLD\ (95\%) = \sqrt{\frac{\text{Gross Background Counts}}{\text{Count Time}}} \times 4.66$$

LLD (95%): _____ _____

REMARKS:

138 90-26
½

AREA CONTAMINATION SURVEY SHEET

Radionuclide(s) Surveyed: ^{35}S ^{14}C Date: 6-4-90

Method of Detection: LSC-460

Radiation Safety Technician

Swipe #	Location RM #	Area	Nuclide: NET CPM	NET DPM	pCi / μCi	Nuclide: NET CPM	NET DPM	μCi
1		BKGRD						
2	170	Door	0	N/A	N/A			
3	138	Door	4	< LLD_{95}				
4	138	Floor - Door	5	< LLD_{95}				
	138	Floor - Hood	0	N/A				
	138	Floor - sink	4	< LLD_{95}				
	138	hood sash	0	N/A				
	138	hood sill	1	< LLD_{95}				
	138	phone	2	< LLD_{95}	↓			
	294	Door	10	10	5			
		Floor (Door)	30	33	15			
		Desk	11	12	6			
		Balance	28	30	14			
		Floor (Balance)	21	23	11			
		Phone	18	19	9			

Calculation of Lower Limits of Detection (LLD)

Nuclide: ~~P~~ P Nuclide: _____

Gross Background Counts: 190

Total Background Count time: _____

(95%) = $\sqrt{\frac{\text{Gross Background Counts}}{\text{Count Time}}}$ x 4.66

LLD (95%): 6

REMARKS:

89-45
1/2

138 & 190

AREA CONTAMINATION SURVEY SHEET

Radionuclide(s) Surveyed: ^{3}H ^{14}C Date: 12-6-89

Method of Detection: LSC 460

Radiation Safety Technician

Swipe #	Location RM #	Area	Nuclide: 3H NET CPM	NET DPM	µCi	Nuclide: 14C NET CPM	NET DPM	µCi
1		BKGRD	(12)			(13)		
	138	E Floor MAT	2	< LLD95		12	15	
		E Floor MAT	1			7	9	
		E Floor MAT	4			4	< LLD95	
		Floor	0			4	< LLD95	
		Floor MAT	2			10	12	
		Floor (door)	0			3	< LLD95	
		Sink	4			12	14	
		phone	0			0	N/A	
		door	5	15		0	N/A	
	190	door	0	N/A		0	N/A	
		phone	10	(27)		2	< LLD95	
		S E Counter W	0	N/A		0	N/A	
		S Counter	0	N/A		3	< LLD95	
		S Counter	0	N/A		0	N/A	

Calculation of Lower Limits of Detection (LLD) Nuclide: 3H Nuclide: 14C

Gross Background Counts: 120 130

Total Background Count time:

)%)= $\sqrt{\frac{\text{Gross Background Counts}}{\text{Count Time}}}$ x 4.66

) (95%)= 5 5

MARKS:

U.S. Environmental Protection Agency
Western Ecology Division

NRC Radioactive Materials License No. 36-12343-02 Termination and Facility Decommissioning

Date: **November 27, 2004**
Subject: **Room Survey: Main Building 149 Final Contamination Survey.**

Description and Historic Use:

Single lab converted to single office (225 ft^2). Nickel-63 and hydrogen-3:scandium sealed sources. No tracer isotopes use since prior to1986. There is no record of leakage of any sealed sources used in this area.

Surveys:

Total (fixed + removable) and removable contamination surveys were conducted in MB 149 in November 2004. This room has been an unrestricted area since prior to 1986. Radioactive materials were not used in this area after 1985.

All points surveyed (4 total and 4 removable) demonstrated no contamination. This area meets the contamination criteria for unrestricted use based upon the isotopes used at our facilities.

We determined it was unnecessary to conduct further contamination surveys in this area given these survey results and the Western Ecology Division's historic management of radioactive material use in this area.

The survey for total contamination was conducted using a Ludlum Model 2000 Scaler equipped with a Ludlum Model 44-9, 12-cm^2 thin-window Geiger-Muller pancake detector. Removable contamination was determined using methanol-wetted swipes counted in a Packard 2200 CA dual channel Liquid Scintillation Counter.

NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY

FIXED SURVEY

DATE 11-11-04 LOCATION NB ROOM 149

INSTRUMENT Ludlum 2000 Scaler Pancake Probe 44-9

SERIAL NO. 83810 / PR070834

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
1	42	LLD_{95}	NA
2	38	0	
3	42		
4	46		

$LLD_{95} = \{(\frac{\sqrt{38}}{0.5}) \times 2.96\}\% = 113$ CPM

BACKGROUND STANDARD (^{14}C 0.16 µCi) 76 CPM / 10540 CPM

2.8% off.

Time 0.5'

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²

$LLD_{95} = \{(\quad) \times 2.96\} + \quad =$ CPM

BACKGROUND STANDARD ( )

COMMENTS:

D. Moran
RADIATION SPCL.

11-16-04
DATE

NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY

DATE 11-11-04 LOCATION MB ROOM 149

INSTRUMENT Packard LSC 2200 CA

SERIAL NO. Ø36755

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
1	2	<LLD95	ND
2	3		
3	4		
4	5		

$LLD_{95} = \left\{\left(\frac{\sqrt{2}}{3}\right) \times 2.96\right\} \frac{4}{4} =$ 7 CPM

BACKGROUND STANDARD (^3H 64,179 DPM) 4 CPM / 56,056 DPM

87% Eff.

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
	14	<LLD95	ND
	14		
	14		
	14		

$LLD_{95} = \left\{\left(\frac{\sqrt{66}}{3}\right) \times 2.96\right\} + 22 =$ 30 CPM

BACKGROUND STANDARD (^{14}C 84,000 DPM) 22 CPM / 85,608 DPM

102% Eff.

COMMENTS:

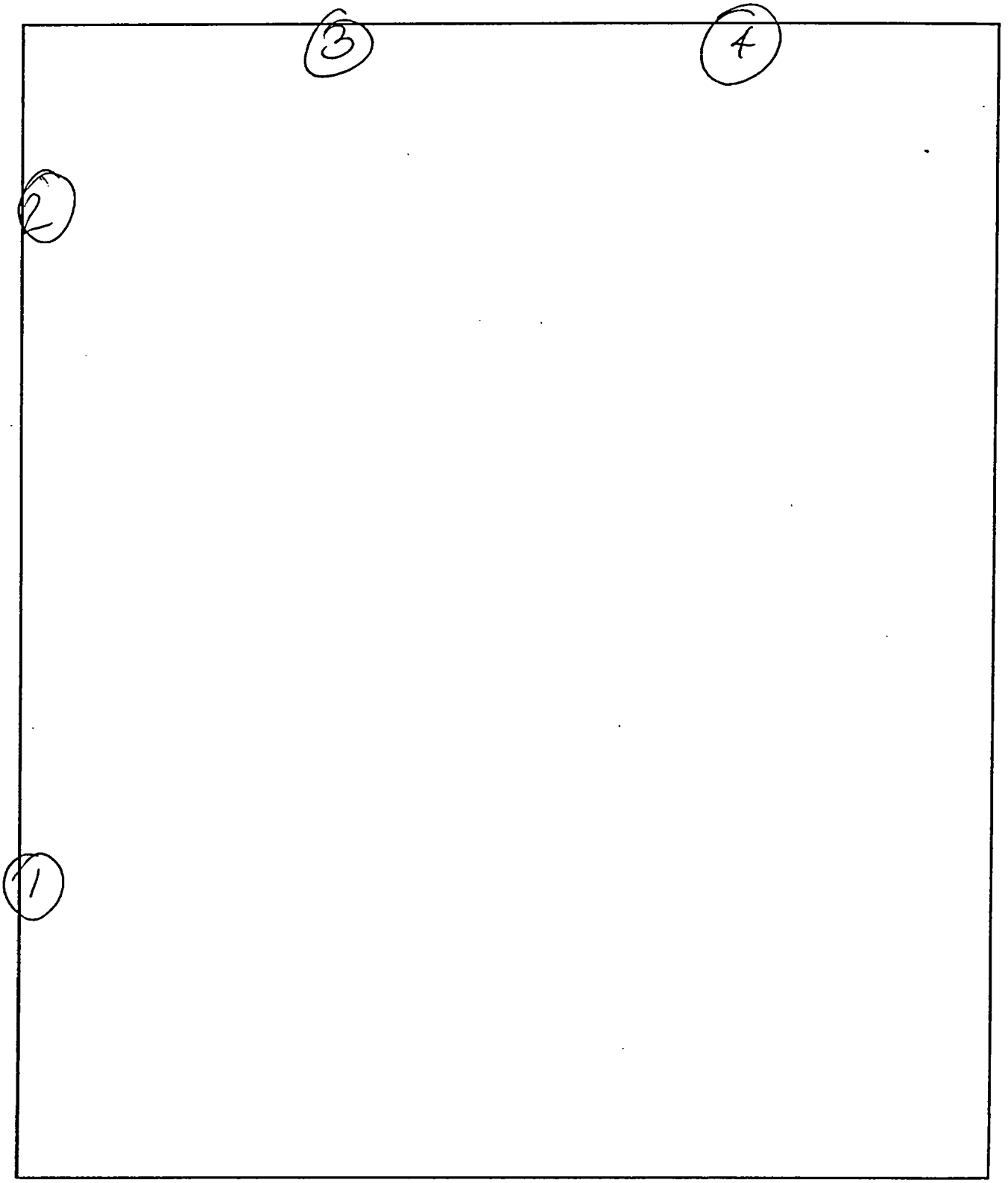
RADIATION SPCL. 11-18-04 DATE

NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY MAP

LOCATION MB ROOM 149



Wall survey

U.S. Environmental Protection Agency
Western Ecology Division

NRC Radioactive Materials License No. 36-12343-02 Termination and Facility Decommissioning

Date: **November 27, 2004**
Subject: **Room Survey: Main Building 150 Final Contamination Survey.**

Description and Historic Use:

Single lab converted to single office (225 ft^2). Nickel-63 and hydrogen-3:Scandium sealed sources. No tracer isotopes use since prior to1986. There is no record of leakage of any sealed sources used in this area.

Surveys:

A total (fixed + removable) and removable contamination surveys were conducted in MB 150 in November 2004. This room has been an unrestricted area since prior to 1986; radioactive materials were not used in this area after 1985.

The four points surveyed (4 total and 4 removable) demonstrated no significant contamination. One swipe indicated very low levels of removable contamination from tritium (0.35 Bq/100 cm^2). This area meets the contamination criteria for unrestricted use based upon the isotopes used at our facilities.

We determined it was unnecessary to conduct further contamination surveys in this area given these survey results and the Western Ecology Division's historic management of radioactive material use in this area. A record of the most recent historic surveys (i.e. prior to the final decommissioning survey) of MB 150 is included in this report.

The survey for total contamination was conducted using a Ludlum Model 2000 Scaler equipped with a Ludlum Model 44-9, 12-cm^2 thin-window Geiger-Muller pancake detector. Removable contamination was determined using methanol-wetted swipes counted in a Packard 2200 CA dual channel Liquid Scintillation Counter.

NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY

FIXED SURVEY

DATE 11-11-04 LOCATION MB ROOM 150

INSTRUMENT Ludlum 2000 Scaler Pancake Probe 44-9

SERIAL NO. 83810 / PR070834

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
1	38	LLD95	NA
2	48	↓	↓
3	46		
4	46		

$LLD_{95} = \left\{ \left(\frac{\sqrt{38}}{0.5} \right) \times 2.96 \right\} \% = 113$ CPM

BACKGROUND STANDARD (^{14}C 0.16 μCi) 76 CPM / 19540 CPM

2.8% eff.

Time 0.5'

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²

$LLD_{95} = \left\{ \left(\text{---------} \right) \times 2.96 \right\} + =$ CPM

BACKGROUND STANDARD ( ) _____

COMMENTS:

R. Monar
RADIATION SPCL.

11-16-04
DATE

NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY

DATE 11-11-04 LOCATION NB ROOM 150

INSTRUMENT Packard LSC 2200CA

SERIAL NO. Ø36755

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
1	4	LLD95	ND
2	4	↓	↓
3	5	↓	↓
4	9	21	0.35

$LLD_{95} = \left\{\left(\frac{\sqrt{12}}{3}\right) \times 2.96\right\}^{4}_{+4} = 7$ CPM

BACKGROUND STANDARD (3H 64,179 dpm) 4 CPM 56,056 DPM 87% eff.

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
	14	LLD95	ND
	15	↓	↓
	15	↓	↓
	13	↓	↓

$LLD_{95} = \left\{\left(\frac{\sqrt{66}}{3}\right) \times 2.96\right\}^{22}_{+} = 30$ CPM

BACKGROUND STANDARD (14C 84,000 DPM) 22 CPM 85,603 DPM 102% eff.

COMMENTS:

D. Monaco
RADIATION SPCL.

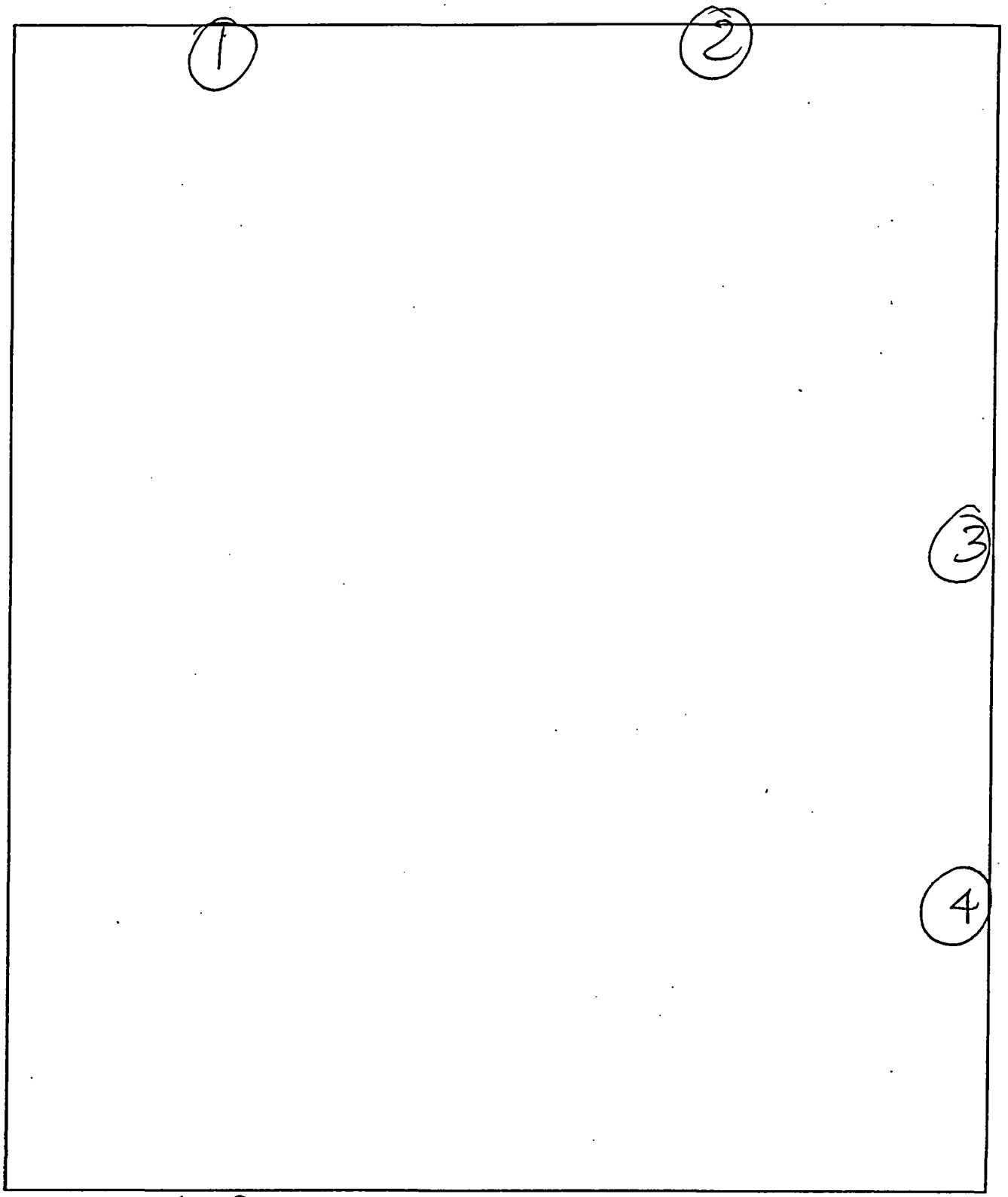
11-18-04
DATE

NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY MAP

LOCATION MB ROOM 150



Wall Survey

(150)

REMOVABLE CONTAMINATION LEVELS (SMEARS)*

DAN Tullo
Surveyor

Comprehensive swipes of All Rad. Areas
Purpose of Survey

10/28/81
Date

81-07

	1	2	3	4	5	6	7	8
Location	BKG	Gross β cpm w/ ^3H	Net β cpm w/ ^3H	Gross β cpm w/o ^3H	Net β cpm w/o ^3H	Net β μCi w/o ^3H	Net ^3H cpm	Net ^3H μCi
Room 150 G.C.	11.0	7.2	0.0					
Rm. 133 LSS	11.0	10.6	0.0					
Rm 133 floor	11.0	8.8	0.0					
Rm 133 Door	11.0	10.8	0.0					
Rm 134 Bench	11.0	9.2	0.0					
Rm 134 floor	11.0	10.6	0.0					
Rm 132 - Hood	11.0	10.4	0.0					
Rm 132 - Oxidizer	11.0	11.8	0.8					
Rm 132 - floor	11.0	8.4	0.0					
Rm 130 - Hood	11.0	16.4	5.4					

* No smearing efficiency value is factored into these results.

Instrument used: GFPC Rm 190

$LLD_{(95\%)}$ = _____ cpm

$LLD_{(\beta \text{ w/o } ^3H)}$ in μCi = _____ μCi

$LLD_{(^3H)}$ in μCi = _____ μCi

USE REVERSE SIDE FOR CALCULATIONS

U.S. Environmental Protection Agency
Western Ecology Division

NRC Radioactive Materials License No. 36-12343-02 Termination and Facility Decommissioning

Date: **November 27, 2004**
Subject: **Room Survey: Main Building 155 Final Contamination Survey.**

Description and Historic Use:

Single room (225 ft^2). No known use of radioisotopes in this room.

Surveys:

A total (fixed + removable) contamination survey was conducted in MB 155 in November 2004.

All points surveyed (6 total) demonstrated no contamination. This area meets the contamination criteria for unrestricted use based upon the isotopes used at our facilities.

We determined it was unnecessary to conduct further contamination surveys in this area given these survey results and the Western Ecology Division's historic management of radioactive material use in the facility.

The survey for total contamination was conducted using a Ludlum Model 2000 Scaler equipped with a Ludlum Model 44-9, 12-cm^2 thin-window Geiger-Muller pancake detector.

NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY

FIXED SURVEY

DATE 11-16-04 LOCATION NB ROOM 155

INSTRUMENT Ludlum 2000 Scaler Pancake Probe 44-9

SERIAL NO. 83810 / PR070834

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
1	34	LLD95	ND
2	64		
3	38		
4	48		
5	44		
6	46		

$LLD_{95} = \left\{ \left(\frac{\sqrt{22}}{0.5} \right) \times 2.96 \right\} + = 72$ CPM

BACKGROUND STANDARD (1¢ 0.168 μCi) 44 CPM / 1,790 CPM

TIME 0.5 min. 3.2%

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²

$LLD_{95} = \left\{ \left(\frac{\quad}{\quad} \right) \times 2.96 \right\} + =$ CPM

BACKGROUND STANDARD ( ) _____

COMMENTS:

D. Monaco
RADIATION SPCL.

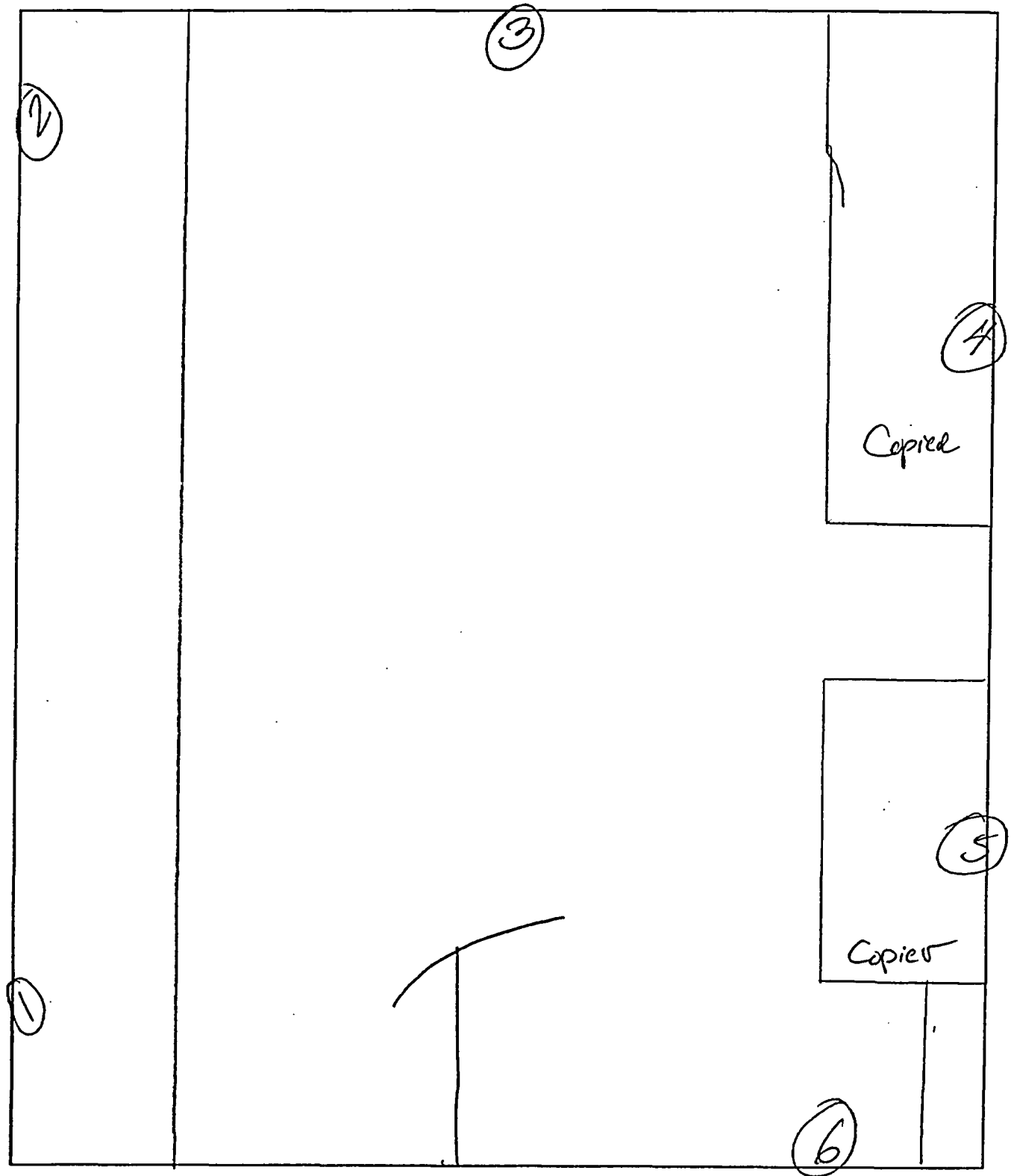
11-16-04
DATE

NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY MAP

LOCATION MB ROOM 155



ALL WALL Surveys

U.S. Environmental Protection Agency
Western Ecology Division

NRC Radioactive Materials License No. 36-12343-02 Termination and Facility Decommissioning

Date: **November 27, 2004**
Subject: **Room Survey: Main Building 159 Final Contamination Survey.**

Description and Historic Use:

Double lab (450 ft^2) converted to a lunch room prior to 1986. Potentially hydrogen-3 and carbon-14 tracers. No isotope use since prior to1980.

Surveys:

A total (fixed + removable) contamination survey was conducted in MB 159 in November 2004. This room has been an unrestricted area since prior to 1980; radioactive materials were not used in this area after 1980.

All points surveyed (4 total) demonstrated no contamination. This area meets the contamination criteria for unrestricted use based upon the isotopes used at our facilities.

We determined it was unnecessary to conduct further contamination surveys in this area given these survey results and the Western Ecology Division's historic management of radioactive material use in this area. A record of the most recent historic surveys (i.e. prior to the final decommissioning survey) of MB 159 is included in this report.

The survey for total contamination was conducted using a Ludlum Model 2000 Scaler equipped with a Ludlum Model 44-9, 12-cm^2 thin-window Geiger-Muller pancake detector.

NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY

FIXED SURVEY

DATE 11-11-04 LOCATION MB ROOM 169

INSTRUMENT Ludlum 2000 Scaler Pancake Probe 44-9

SERIAL NO. 83810 / PR070834

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
1.	24	LLD95	ND
2	30	↓	↓
3	36	↓	↓
4	28	↓	↓

$LLD_{95} = \left\{\left(\frac{\sqrt{38}}{0.5}\right) \times 2.96\right\}\% = 113$ CPM

BACKGROUND STANDARD (^{14}C 0.16 µCi) 76 CPM / 10340 CPM, 2.8% off.

Time 0.5'

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²

$LLD_{95} = \left\{\left(\text{-------}\right) \times 2.96\right\} + = $ CPM

BACKGROUND STANDARD ( ) _____

COMMENTS:

RADIATION SPCL.

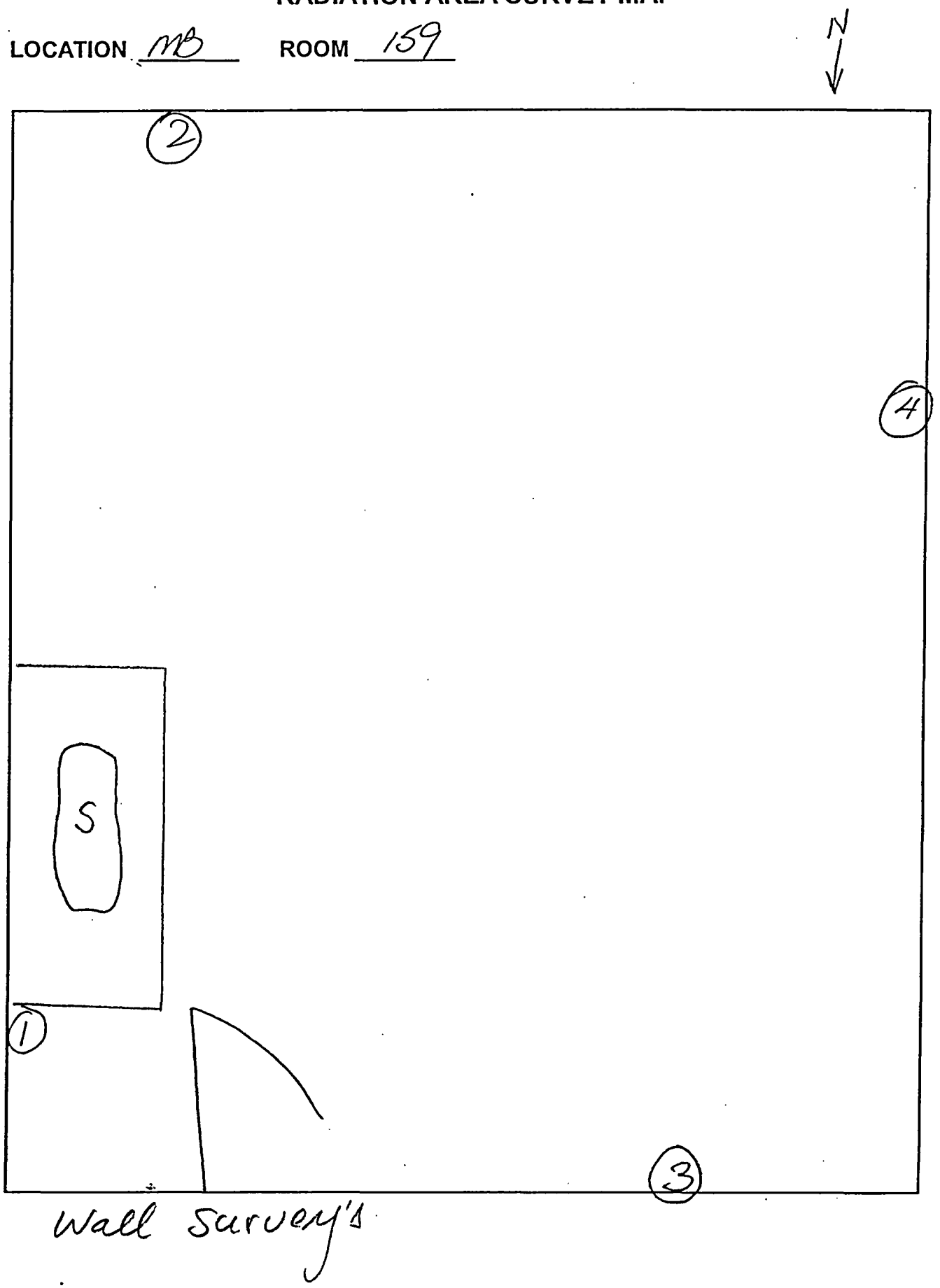
11-16-04
DATE

NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY MAP

LOCATION MB ROOM 159



Wall Surveys

(270) 80-23
159

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

SUBJECT: Vacating Room 270 and Room 159 Box #1 DATE: 31 Oct 80

FROM: Ron Riley RJR

TO: Radiation Safety Officer

via: Assistent Radiation Safety Officer

This is to notify you that as of November 5, 1980 I will no longer occupy rooms 270 and ~~Room~~ 159 (Box #1). All Radioactive materials have been properly disposed or transferred. Attach is the count data for "swipes" taken at various locations used for handling or storing radioisotopes. To the best of my knowledge there is no radioactive contamination in either of these rooms.

EPA Form 1320-6 (Rev. 6-72)

RDR H.P.

U.S. Environmental Protection Agency
Western Ecology Division

NRC Radioactive Materials License No. 36-12343-02 Termination and Facility Decommissioning

Date: **November 27, 2004**
Subject: **Room Survey: Main Building 173 Final Contamination Survey.**

Description and Historic Use:

Large Library Room (900 ft^2). No known use of radioisotopes in this room.

Surveys:

A total (fixed + removable) contamination survey was conducted in MB 173 in November 2004.

All points surveyed (8 total) demonstrated no contamination. This area meets the contamination criteria for unrestricted use based upon the isotopes used at this facility.

We determined it was unnecessary to conduct further contamination surveys in this area given these survey results and the Western Ecology Division's historic management of radioactive material use in the facility.

The survey for total contamination was conducted using a Ludlum Model 2000 Scaler equipped with a Ludlum Model 44-9, 12-cm^2 thin-window Geiger-Muller pancake detector.

NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY

FIXED SURVEY

DATE 11-16-04 LOCATION MB ROOM 173

INSTRUMENT Ludlum 2000 Scaler Pancake Probe 44-9

SERIAL NO. 83810 / PR070834

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
1	68	LLD95	ND
2	46		
3	42		
4	54		
5	48		
6	42		
7	38		
8	46		

$LLD_{95} = \left\{\left(\frac{\sqrt{82}}{0.5}\right) \times 2.96\right\} + = 72$ CPM

BACKGROUND 44 CPM

STANDARD (^{14}C 0.168 µCi) 11,190 cpm

TIME 0.5' 3.2%

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²

$LLD_{95} = \left\{\left(\text{--------}\right) \times 2.96\right\} + =$ CPM

BACKGROUND _____

STANDARD (_____)

COMMENTS:

D Monaco
RADIATION SPCL.

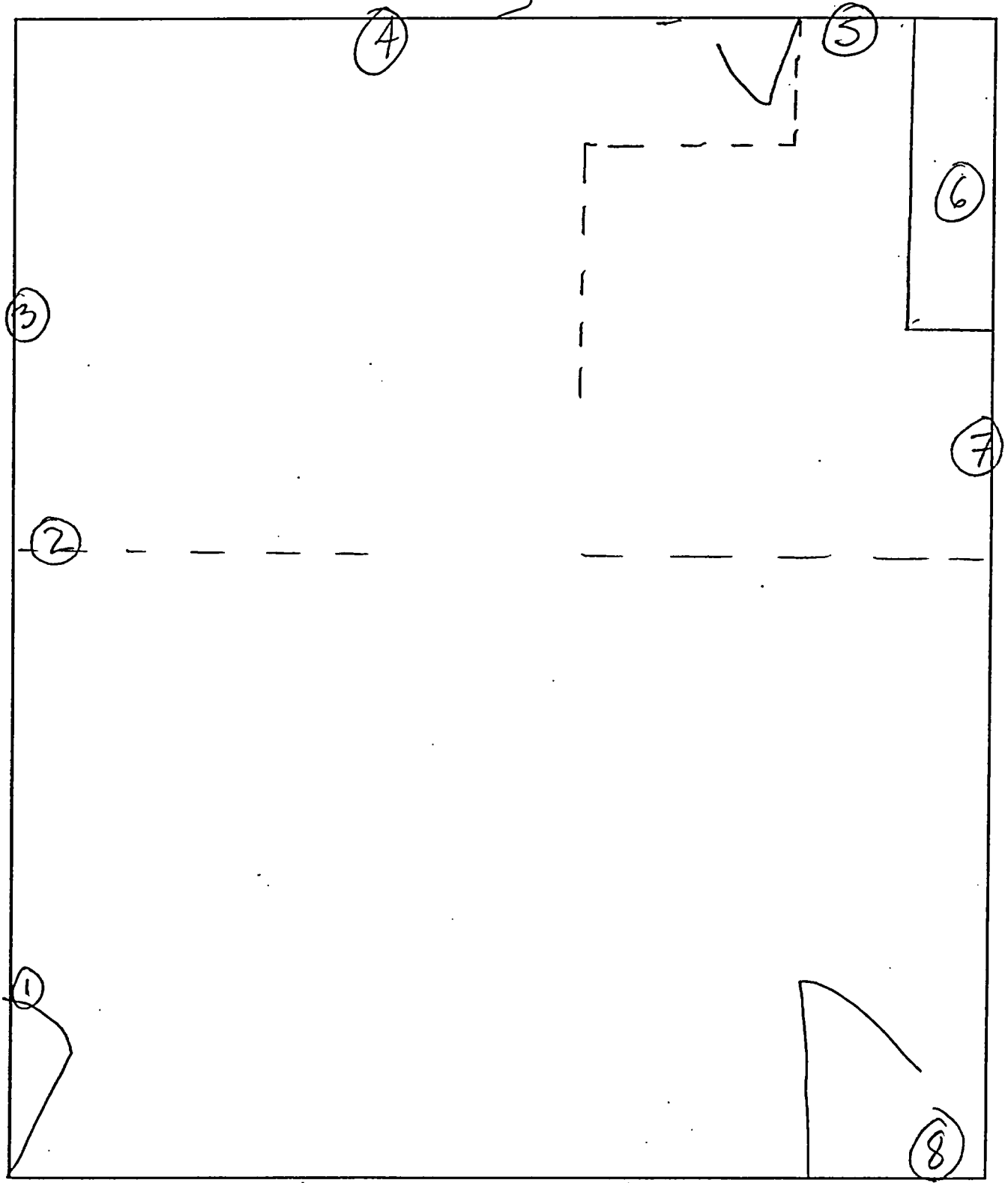
11-16-04
DATE

NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY MAP

LOCATION NB ROOM 173 Library



Wall Survey / except #6 (Desk)

U.S. Environmental Protection Agency
Western Ecology Division

NRC Radioactive Materials License No. 36-12343-02 Termination and Facility Decommissioning

Date: November 27, 2004
Subject: Room Survey: Main Building 190 Final Contamination Survey.

Description and Historic Use:

Single Lab (225 ft^2). This is the Radiation Safety Laboratory/Office. All radioisotopes tracers and sealed sources used at the Western Ecology Division were stored and/or handled in MB 190. Only references and standards are presently stored in this area pending final decommissioning approval and license termination. No sealed sources were used in this area.

Surveys:

Total (fixed + removable) and removable contamination surveys were conducted in MB 190 in November 2004. All total contamination surveys (38 total) demonstrated no contamination. Six swipes indicated very low levels of removable contamination from tritium (0.14 – 1.73 Bq/100 $cm^{2)}$ and/or carbon-14 (0.25 – 1.85 Bq/100 cm^2). The swipe of the exhaust plenum of a portable ventilation cabinet indicated both tritium and carbon-14 contamination (3.98 – 5.08 Bq/100 cm^2). This will be decontaminated when disassembled. The sanitary sewer drain line indicated contamination of the iron tail piece (3.47 and 12.25 Bq/100 cm^2 of tritium and carbon-14 respectively). This piece will be removed, decontaminated, and disposed when the lab is disassembled as scheduled (when decommissioning is complete). Both the ventilation cabinet and the drain tail piece are less than the NRC criteria for contamination in an unrestricted area. All other sampling points were at background. This area meets the contamination criteria for unrestricted use based upon the isotopes used at our facilities. A HVAC duct swipe was made in November 2004 which detected contamination of 0.37 Bq/100 cm^2 of carbon-14.

Records for this room clearly demonstrate that contamination surveys were regularly performed, the area was not subject to any significant contamination events, and the room was maintained as a contaminate-free area. We determined it was unnecessary to conduct further contamination surveys in this area given these survey results and the Western Ecology Division's historic management of radioactive material use in this area. Records of the most recent historic surveys (i.e. prior to the final decommissioning surveys) of MB 190 are included in this report.

The survey for total contamination was conducted using a Ludlum Model 2000 Scaler equipped with a Ludlum Model 44-9, 12-cm^2 thin-window Geiger-Muller pancake detector. Removable contamination was determined using methanol-

wetted swipes counted in a Packard 2200 CA dual channel Liquid Scintillation Counter.

NHEERL-WED

RADIATION AREA SURVEY

FIXED SURVEY

LOG NO. 04-0 04-25

DATE 11-24-04 LOCATION MB ROOM 190 1/2

INSTRUMENT Ludlum 2000 Scaler PANcake Probe 44-9

SERIAL NO. 83810 / PR070834

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
1	62	Ø	ND*
2	70	<LLD95	
3	82	↓	
4	48	<LLD95	
5	74	<LLD95	
6	30	<LLD95	
7	48		
8	44		
9	56		
10	52		
11	48		
12	62		
13	72	↓	↓
14	105	↓	↓
15	54	<LLD95	ND
16	62		
17	56		
18	64		
19	62	↓	
20	68	<LLD95	
21	42		
22	48		
23	40		
24	58		
25	48		
26	58		
27	36	↓	
28	28	↓	↓

$LLD_{95} = \left\{ \left(\frac{\sqrt{62}}{0.5} \right) \times 2.96 \right\} + \cdot = 108$ CPM

BACKGROUND STANDARD (^{14}C 62 CPM / 0.168 μCi) 18,347 CPM

4.9% eff.

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²

$LLD_{95} = \left\{ \left(\text{--------} \right) \times 2.96 \right\} + = $ CPM

BACKGROUND STANDARD ( ) _____

COMMENTS:

HALL BKGRD: 42, 40, 46 $\bar{x}$ =

HALL FLOOR: 72, 56, 58

STD: 9039/0.5', 9087, 9395

$\bar{x}$ = 9174 × 2 = 18,347 cpm

J Murray
RADIATION SPCL.

11-24-04
DATE

ND* = NOT DETERMINED, Below the Detection Limits

^{14}C = 0.168 μCi 4.9% eff

NHEERL-WED

LOG NO. 04-25

RADIATION AREA SURVEY

FIXED SURVEY

DATE 11-24-04 LOCATION NB ROOM 190

INSTRUMENT Ludlum 2000 Scaler Pancake Probe 44-9 2/2

SERIAL NO. 83810 / PR070834

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
29	48	LLD95	ND
30	40		
31	38		
32	64		
33	20		
34	60		
35	62		
36	30		
37	64		
38	84		

Dishwasher

$LLD_{95} = \{(\text{---------}) \times 2.96\} + \text{ } = \text{ CPM}$

BACKGROUND STANDARD ( ) _____

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²

$LLD_{95} = \{(\text{---------}) \times 2.96\} + \text{ } = \text{ CPM}$

BACKGROUND STANDARD ( ) _____

COMMENTS:

RADIATION SPCL. _____ DATE _____

NHEERL-WED

RADIATION AREA SURVEY

REMOVABLE

LOG NO. 04-25 1/2

DATE 11-24-04 LOCATION NB 190 ROOM 190

INSTRUMENT LSC 2000 CA PACKARD
SERIAL NO. Ø36755

3-H

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
1	4	LLD95	ND*
2	9		
3	5		
4	5		
5	4		
6	3		
7	11		
8	61	104	1.73
9	42	67	1.12
10	6	LLD95	ND
11	6		ND
12	12	9	0.14
13	22	28	0.17
14	11	LLD95	ND
15	4		
16	6		
17	6		
18	3		
19	8		
20	9		
21	6		
22	6		
23	5		
24	1		
25	8		
26	4		
27	10		
28	12	9	0.14

$LLD_{95} = \left\{\left(\frac{\sqrt{21}}{3}\right) \times 2.96\right\} + = (12 \text{ CPM})$

BACKGROUND STANDARD (^3H 64,179 DPM) 7 CPM 64,012 dpm

14-C

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
	14	LLD95	ND
	16		
	14		
	13		
	18		
	16		
	18		
	127	111	1.85
	103	87	1.45
	11	LLD95	ND
	15		
	25		
	92	76	1.27
	37	21	0.35
	17	LLD95	ND
	17		
	14		
	12		
	18		
	15		
	17		
	19		
	16		
	14		
	15		
	16		
	16		
	31	15	0.25

$LLD_{95} = \left\{\left(\frac{\sqrt{39}}{3}\right) \times 2.96\right\} + = (19 \text{ CPM})$

BACKGROUND STANDARD (^{14}C 84,000 DPM) 13 CPM 85,008

COMMENTS: ND* = NOT DETERMINED. Below the detection limits.

J. Monca
RADIATION SPCL.

11-26-04
DATE

NHEERL-WED

RADIATION AREA SURVEY

LOG NO. 04-25
2/2

DATE 11-24-04 LOCATION MB ROOM 190

INSTRUMENT
SERIAL NO.

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM^2
29	7	LLD$_{95}$	ND*
30	9	↓	↓
31	4		
32	6		
33	6		
34	10		
35	6		
36	8		
37 (Dishwasher)	7	↓	↓
38	130	239	3.98

LLD$_{95}$={((----------) X 2.96} + = CPM

BACKGROUND
STANDARD ( )

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM^2
	14	LLD$_{95}$	ND*
	13	↓	↓
	15		
	14		
	11	↓	↓
	31	15	0.25
	14	↓	ND*
	15		↓
	15	↓	↓
	321	305	5.08

LLD$_{95}$={((----------) X 2.96} + = CPM

BACKGROUND
STANDARD ( )

COMMENTS:

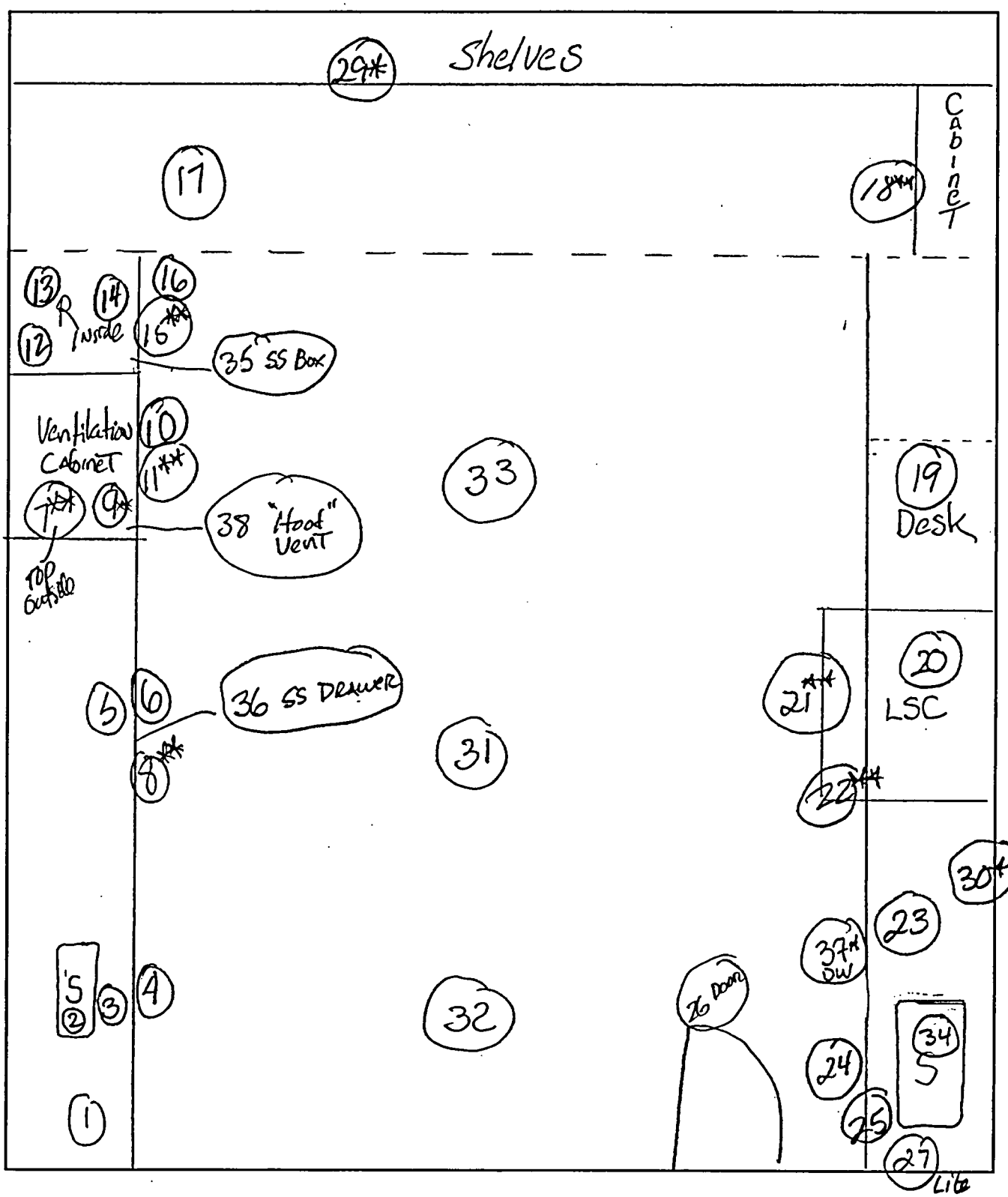
RADIATION SPCL. DATE

NHEERL-WED

LOG NO. 04-25

RADIATION AREA SURVEY MAP

LOCATION MB ROOM 190



NHEERL-WED

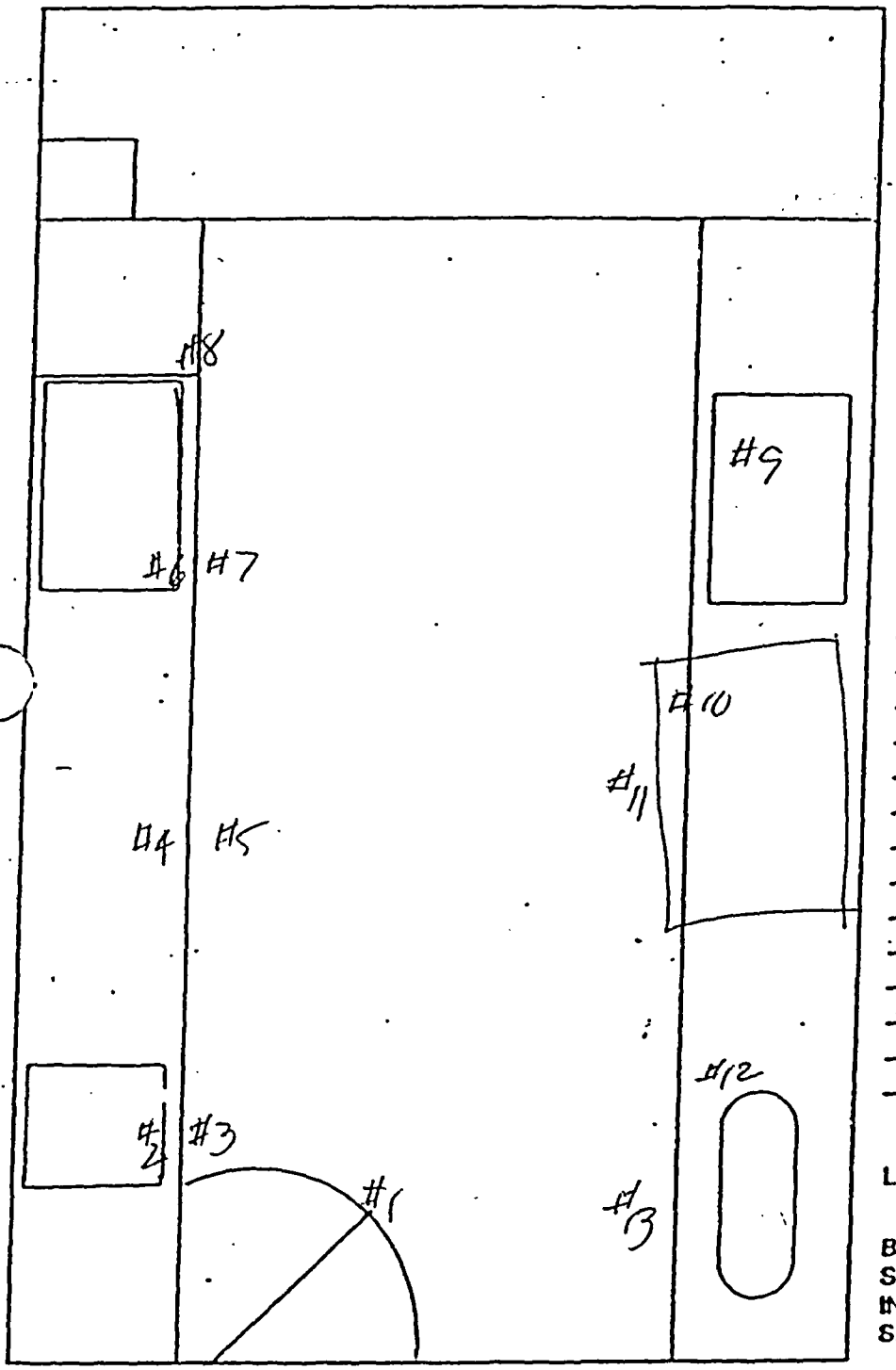
RADIATION AREA SURVEY

FIXED

LOG NO. 04-18 2/2

DATE 10/4/04

LOCATION MAIN BLDG ROOM 190



SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
1	125	LLD95	ND*
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			

$LLD_{95} = \{(\sqrt{125}) \times 2.96\} + 158$ CPM

BACKGROUND 125 CPM

STANDARD (137Cs = 1 μCi) 10,500 CPM

INSTRUMENT Ludlum # 3

SERIAL NO. 77176

COMMENTS: ND* = NOT DETERMINED. Below the detection limit.

P. Mann
RADIATION SPCL.

10/4/04
DATE

NHEERL-WED

RADIATION AREA SURVEY

REMOVABLE-LSC

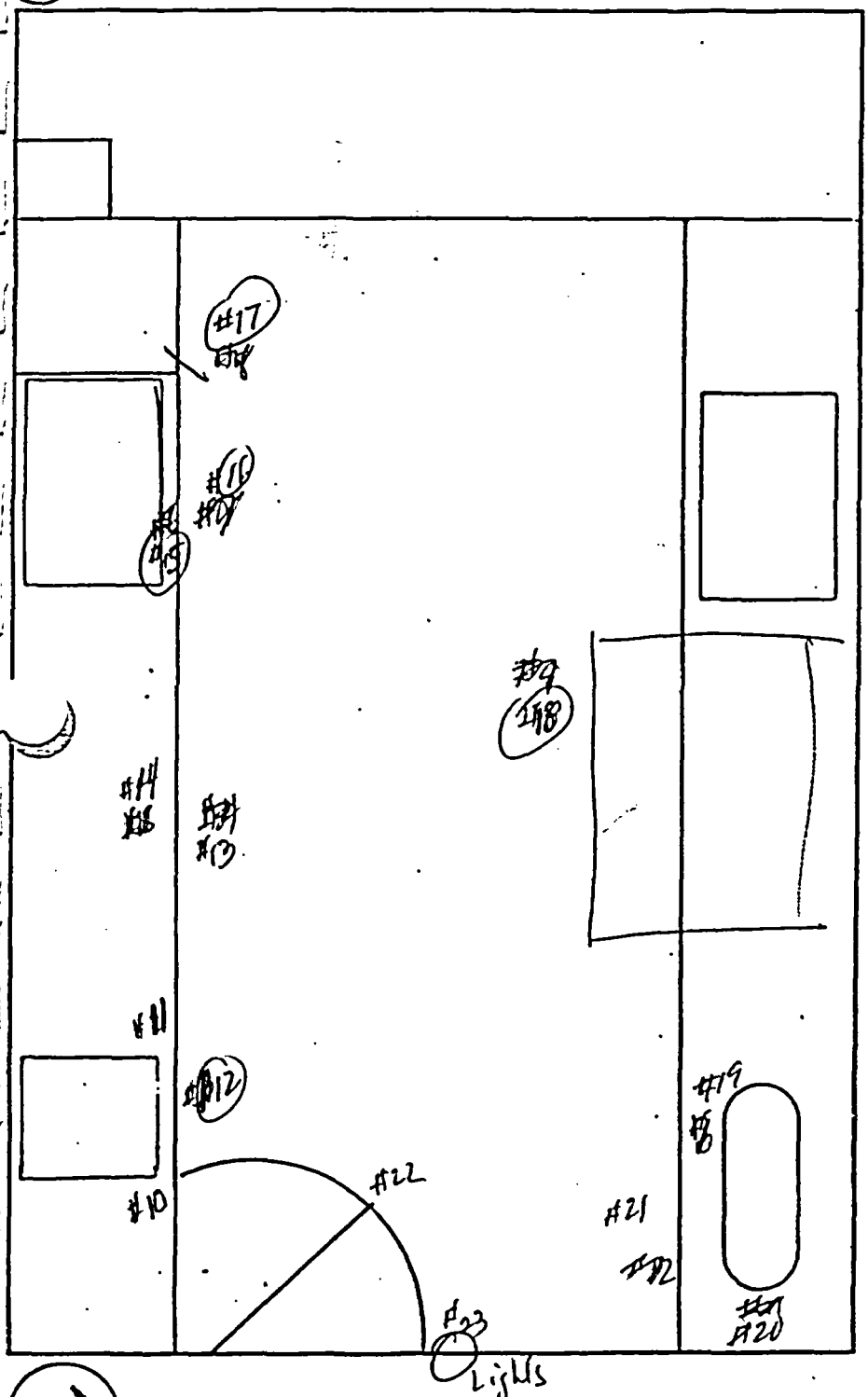
LOG NO. 04-13

1/4

DATE 06-08-04

LOCATION MAIN BLDG ROOM 190

3H



SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
10	5	LLD_{95}	ND*
11	15		
12	5		
13	6		
14	14		
15	10		
16	3		
17	7		
18	8		
19	7		
20	5		
21	9		
22	10		
23	9		

B = 16 CPM

$LLD_{95} = \left\{\left(\frac{\sqrt{3+10}}{3}\right) \times 2.96\right\} + B$ = CPM

BACKGROUND 10.33 CPM

STANDARD (^3H) (4,179 DPM) 73,375 DPM

INSTRUMENT Packard 2200 CA

SERIAL NO. 036755

COMMENTS: ND* = NOT DETERMINED BELOW THE Detection Limits of the Instruments.

C A Mix
RADIATION SPCL.

6/13/04
DATE

No Contamination

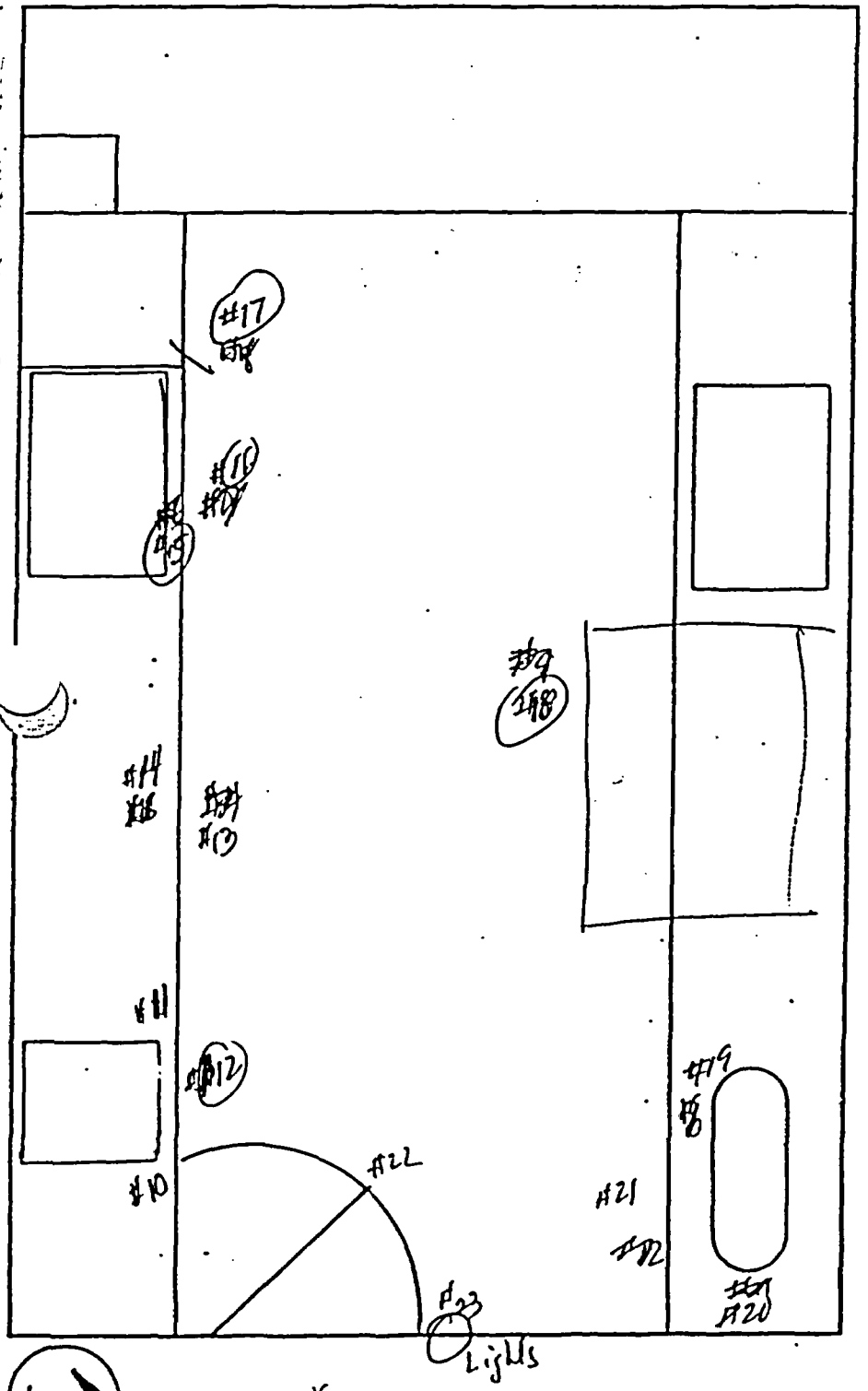
NHEERL-WED
RADIATION AREA SURVEY

LOG NO. 04-13 3/4

DATE 06-08-04

LOCATION MAIN BLDG ROOM 190

14 C



SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
10	28	LLD_{95}	ND*
11	66	44	0.73 !
12	28	LLD_{95}	ND*
13	21		
14	26		
15	36		
16	29		
17	30		
18	25		
19	24		
20	28		
21	27		
22	23		
23	30		

41 CPM

$LLD_{95} = \left\{ \left(\frac{\sqrt{31.33 \times 3}}{3} \right) \times 2.96 \right\} + = $ CPM

BACKGROUND 31.33 CPM
STANDARD (¹⁴C 84,000 DPM) 84,914 DPM
INSTRUMENT Packard 2200CA
SERIAL NO. 1036755

N

COMMENTS: *ND = NOT DETERMINED. BELOW THE DETECTION LIMITS OF THE INSTRUMENTS

6/13/04 Q.A Mon
RADIATION SPCL. DATE

[redacted]

Contamination is restricted to "Contamination Area" of restricted RAD lab. Will be decontaminated. Om

NHEERL-WED

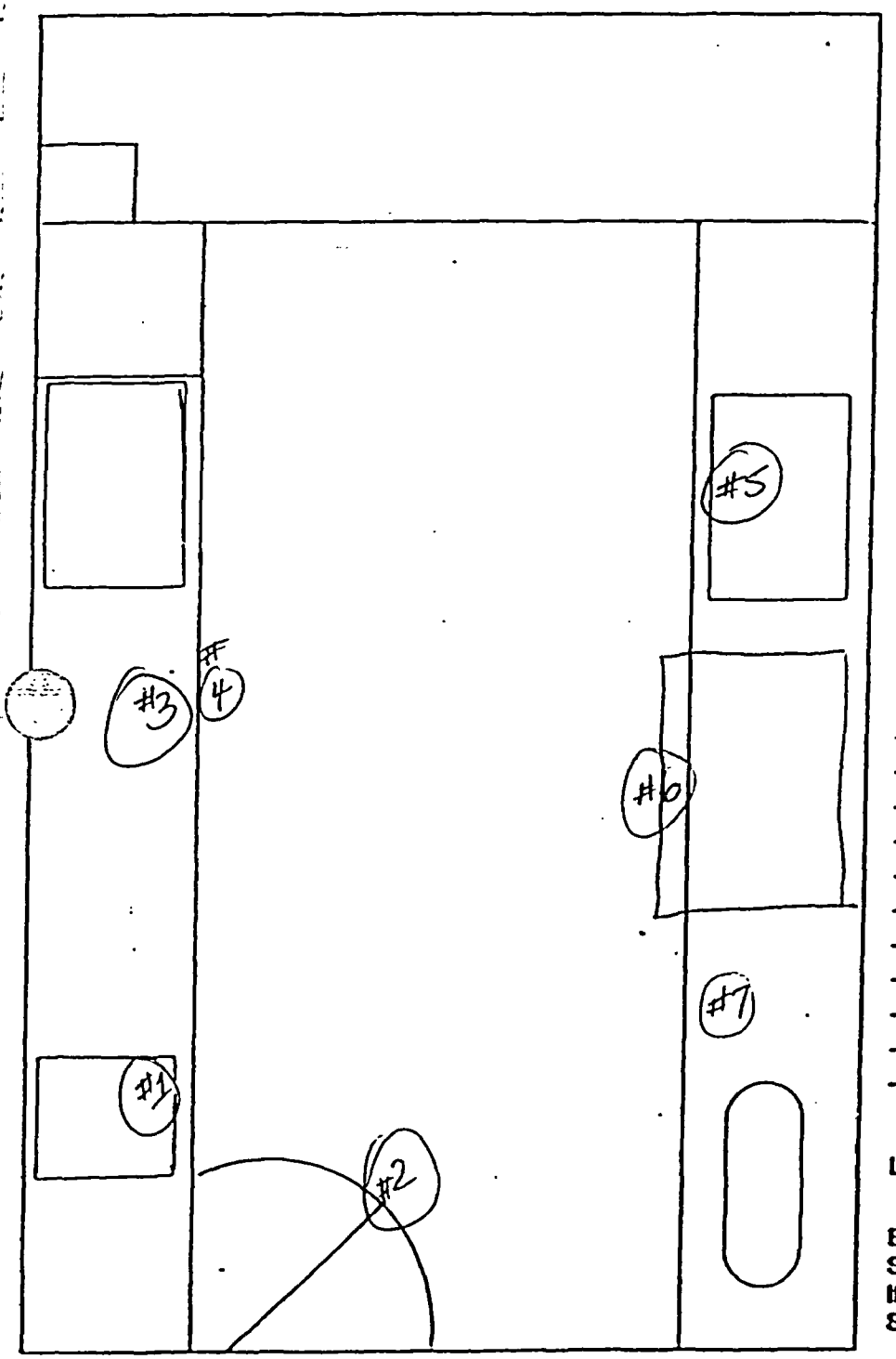
LOG NO. 04-03

RADIATION AREA SURVEY

DATE 2-4-04

LOCATION MAIN BLDG ROOM 190

REMOVABLE



SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
1	26	LLD95	ND*
2	33	↓	↓
3	24		
4	25		
5	28		
6	29		
7	20	↓	↓

$LLD_{95} = \left\{\left(\frac{\sqrt{58}}{2}\right) \times 2.96\right\} + 40.27 = \text{CPM}$

BACKGROUND 29 × 2 = 58

STANDARD (63Ni- 111,100 dpm 11,766 DPM

INSTRUMENT LSC 2200 CA

SERIAL NO. 036755

COMMENTS: ND* = NOT DETERMINED. BELOW THE DETECTION LIMITS OF THE INSTRUMENT.

RADIATION SPCL

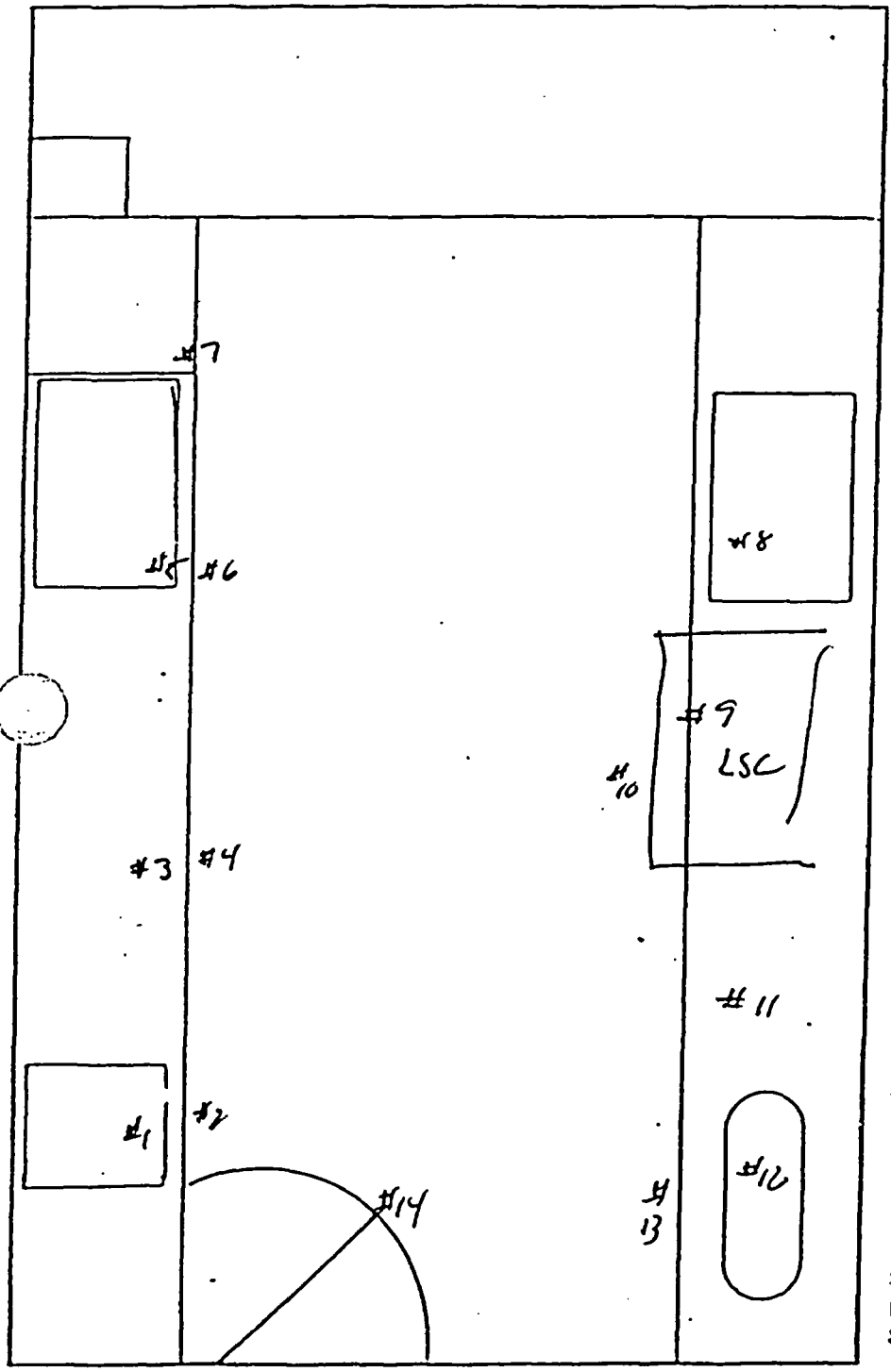
2-5-04
DATE

NHEERL-WED
RADIATION AREA SURVEY

LOG NO. 04-01
2/2

DATE 1/2/04 ON 1/4/04 FIXED

LOCATION MAIN BLDG ROOM 190



SWIPE #	GROSS CPM	NET DPM	ACTIVITY $Bq/100\ CM^2$
1	125	LLD95	ND*
2	U	U	U
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			

$LLD_{95} = \{(\sqrt{125}) \times 2.96\} = 157$ CPM

BACKGROUND 125 CPM
STANDARD (137Cs @ 1µC) 10,500
INSTRUMENT Ludlum #3
SERIAL NO. 77176

N

COMMENTS: * ND* = NOT DETERMINED BELOW THE DETECTION LIMIT OF THE INSTRUMENT.

RADIATION SPCL

1/21/04
DATE

NHEERL-WED

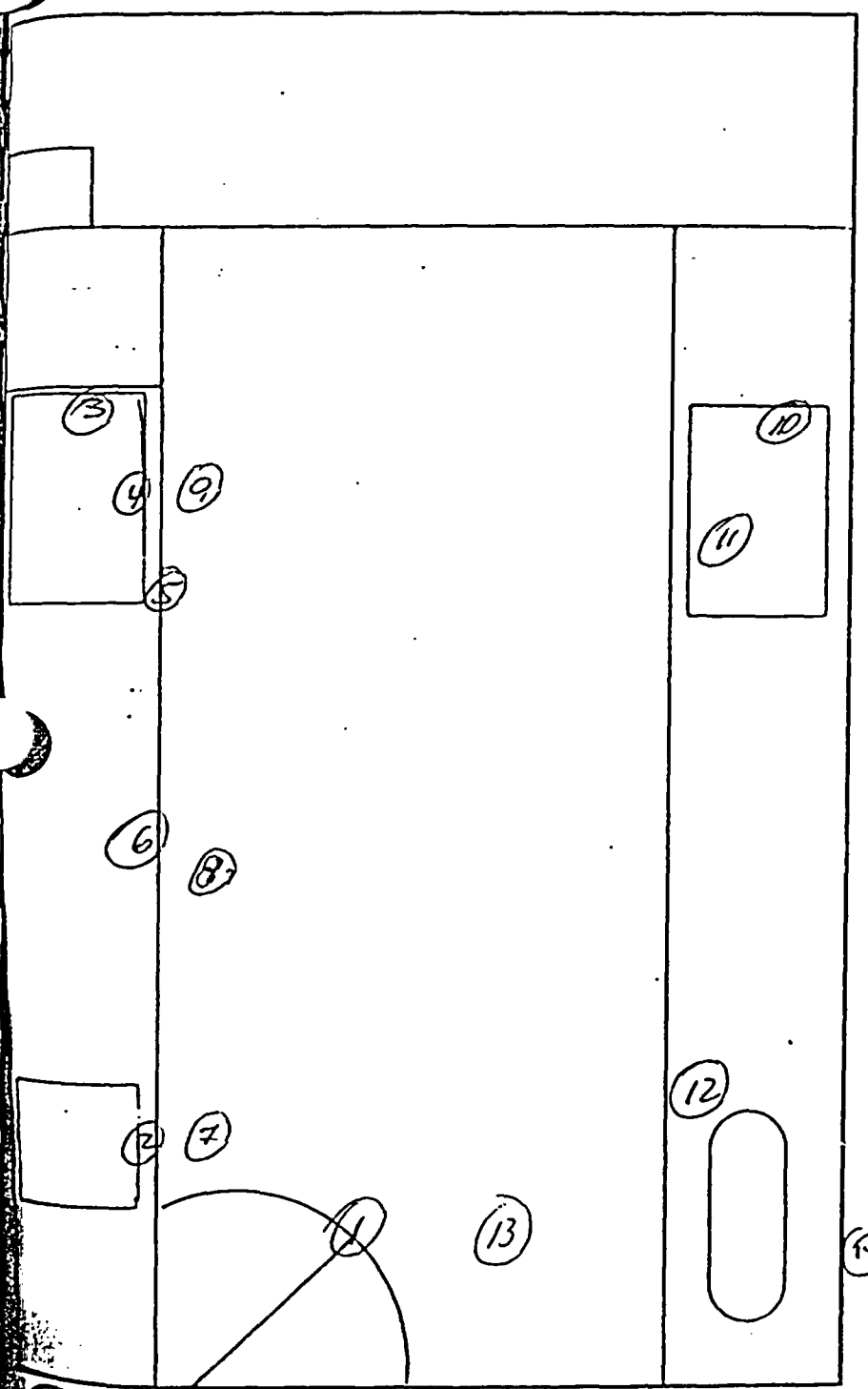
RADIATION AREA SURVEY

LOG NO. 96-29

DATE 11-26-96

LOCATION MAIN BLDG ROOM 190

14C



SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
			ND
1	27	LLD95	~~Act~~
2	18	"	
3	23	"	
4	30	13	0.22
5	18	LLD95	ND
6	24	"	
7	20	"	
8	24	"	
9	23	"	
10	20	"	
11	21	"	
12	21	"	
13	27	"	

$LLD_{95} = \left\{ \left(\frac{\sqrt{36}}{2} \right) \times 2.96 \right\} + 18 = 27$ CPM

BACKGROUND 18 CPM (21 DPM)

STANDARD (14C 54000) 55,875

INSTRUMENT Packard 2200CA

SERIAL NO. 036755

COMMENTS: Re-Swipes

RADIATION SPCL.

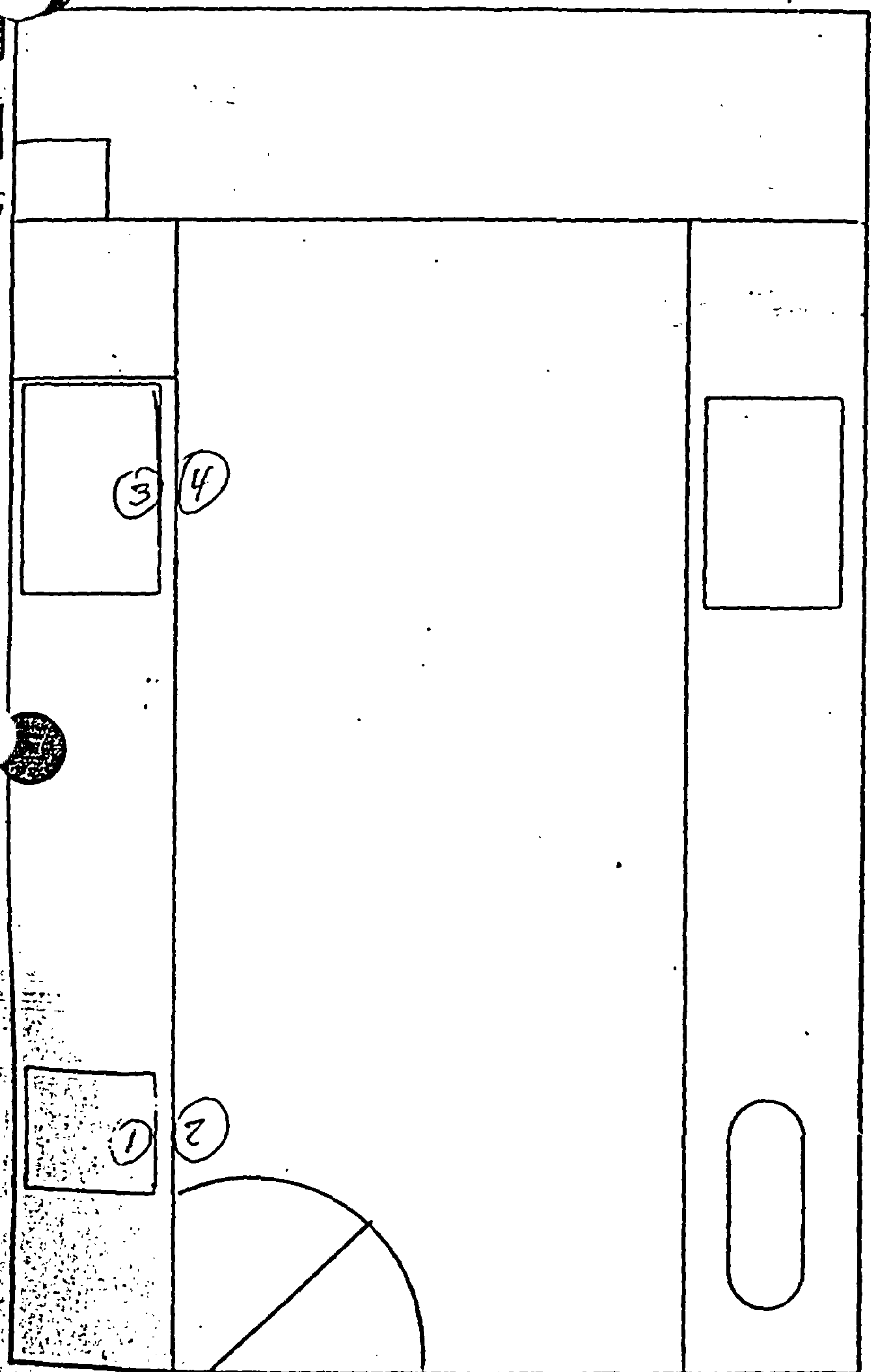
11/27/96
DATE

NHEERL-WED LOG NO. [illegible]

RADIATION AREA SURVEY

FIXED

DATE 10/29/96 LOCATION MAIN BLDG ROOM 190



SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM^2	
1	75	Ø	Ø	10/29/9
2	75	↓	↓	10/29
3	75	↓	↓	10/29
4	75	↓	↓	10/29/9
B	75	↓	↓	10/29/9
1	75	Ø	Ø	10/30/9
2	75	↓	↓	10/30/9
3	75	↓	↓	10/30/
4	75	↓	↓	10/30/
B	75	↓	↓	10/30/9
1	75	ND	Ønet	10/31/
2	75	↓	↓	↓
3	75	↓	↓	↓
4	75	↓	↓	↓
B	75	↓	↓	↓
1	70	ND	Ønet	11-5
2	70	↓	↓	↓
3	70	↓	↓	↓
4	70	↓	↓	↓
B	70	↓	↓	↓
1	70	ND	Ønet	11-7
2	70	↓	↓	↓
3	70	↓	↓	↓
4	70	↓	↓	↓
B	70	↓	↓	↓

$LLD_{95}=\left\{\left(\frac{\sqrt{75}}{1}\right) X\ 2.96\right\} + =$ CPM

BACKGROUND 75 cpm

STANDARD (^{137}Cs [illegible]) 9500 cpm

INSTRUMENT Ludlum #3

SERIAL NO. 77146

COMMENTS:

[signature]
RADIATION SPCL.

11-7-96
DATE

U.S. Environmental Protection Agency
Western Ecology Division

NRC Radioactive Materials License No. 36-12343-02 Termination and Facility Decommissioning

Date: **November 27, 2004**
Subject: **Room Survey: Main Building 204 Final Contamination Survey.**

Description and Historic Use:

Single lab (225 ft^2). Rubidium-86 and phosphorus-32 tracers, and nickel-63 sealed sources. Radioisotopes were not used in this room since 1994. There is no record of leakage of any sealed sources used in this area.

Surveys:

A total (fixed + removable) contamination survey was conducted in MB 204 in November 2004. All points surveyed (5 total) demonstrated no contamination. This area meets the contamination criteria for unrestricted use based upon the isotopes used at our facilities.

We determined it was unnecessary to conduct further contamination surveys in this area given these survey results and the Western Ecology Division's historic management of radioactive material use in this area. A record of the most recent historic surveys (i.e. prior to the final decommissioning survey) of MB 204 is included in this report.

The survey for total contamination was conducted using a Ludlum Model 2000 Scaler equipped with a Ludlum Model 44-9, 12-cm^2 thin-window Geiger-Muller pancake detector.

NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY

FIXED SURVEY

DATE 11-11-04 LOCATION MB ROOM 204

INSTRUMENT Ludlum 2000 Scaler Pancake Probe 44-9

SERIAL NO. 83810 / PR070834

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
1	32	LLD95	ND
2	26	↓	↓
3	22		
4	22		
5	38		

$LLD_{95} = \left\{\left(\frac{\sqrt{38}}{0.5}\right) \times 2.96\right\}\% = 113$ CPM

BACKGROUND STANDARD (^{14}C 0.16 µCi) 76 CPM / 10540 CPM, 2.8% eff.

Time 0.5'

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²

$LLD_{95} = \left\{\left(\text{---------}\right) \times 2.96\right\} + =$ CPM

BACKGROUND STANDARD ( )

COMMENTS:

RADIATION SPCL.

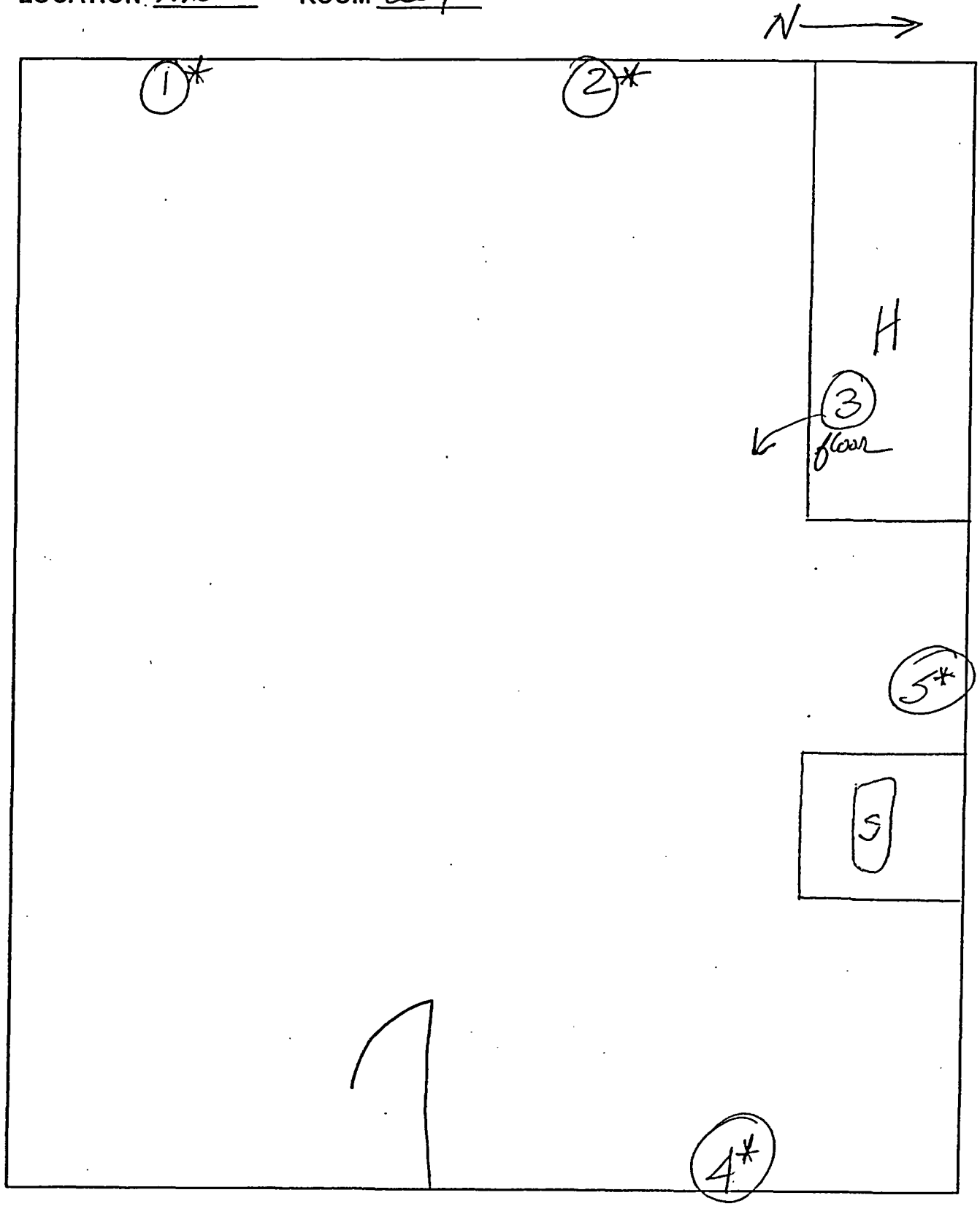
11-16-04
DATE

NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY MAP

LOCATION MB ROOM 204



89-7

5/5

AREA CONTAMINATION SURVEY SHEET

Radionuclide(s) Surveyed: ^{32}P Date: 4-28-89

Method of Detection: LSC 460

Radiation Safety Technician

Blsep CPM: 23 5-1700 CPM 50-1700 89

Swipe #	Location RM #	Area	Nuclide: NET CPM	NET DPM	µCi	Nuclide: NET CPM	NET DPM	µCi
2	204	Door	54			53		
3		Phone	20			17		
4		Floor	3	<LLD95		4	<LLD95	
5		Floor	0			0		
6		Power Supply	2	<LLD95		2	<LLD95	
7		Counter	0			0		
8	224	Door	10			10		
		Hood Sash	1	<LLD95		4	<LLD95	
		Hood Sill	40			59		
		Floor	0			0		
		Floor	0			2	<LLD95	
		Desk	0			0		

Calculation of Lower Limits of Detection (LLD)

	Nuclide: 5-1700	Nuclide: 50-1700
Gross Background Counts:	69	27
Total Background Count time:	3	3

$$LLD\ (95\%) = \sqrt{\frac{\text{Gross Background Counts}}{\text{Count Time}}} \times 4.66$$

LLD (95%)=	13	8

REMARKS:

U.S. Environmental Protection Agency
Western Ecology Division

NRC Radioactive Materials License No. 36-12343-02 Termination and Facility Decommissioning

Date: **November 27, 2004**
Subject: **Room Survey: Main Building 226 Final Contamination Survey.**

Description and Historic Use:

Small single lab (225 ft^2). Potentially hydrogen-3 and carbon-14 tracers. No isotope use since prior to 1986.

Surveys:

Total (fixed + removable) and removable contamination surveys were conducted in MB 226 in November 2004. This room was a unrestricted area since prior to 1986; radioactive materials were not used in this area after 1985.

All points surveyed (9 total and 9 removable) demonstrated no significant contamination. One point indicated very low levels of removable contamination from tritium (0.38 Bq/100 cm^2). All other sampling points were at background. This area meets the contamination criteria for unrestricted use based upon the isotopes used at our facilities. .

Records for this room clearly demonstrate that contamination surveys were regularly performed, the area was not subject to any significant contamination events, and the room was maintained as a contaminate-free area. We determined it was unnecessary to conduct further contamination surveys in this area given these survey results and the Western Ecology Division's historic management of radioactive material use in this area. Records of the most recent historic surveys (i.e. prior to the final decommissioning surveys) of MB 226 are included in this report.

The survey for total contamination was conducted using a Ludlum Model 2000 Scaler equipped with a Ludlum Model 44-9, 12-cm^2 thin-window Geiger-Muller pancake detector. Removable contamination was determined using methanol-wetted swipes counted in a Packard 2200 CA dual channel Liquid Scintillation Counter.

NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY

FIXED SURVEY

DATE 11-11-04 LOCATION MB 226 ROOM 226

INSTRUMENT Ludlum 2000 Scaler Pancake Probe 44-9

SERIAL NO. 83810 / PR070834

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
1	32	LLD95	ND
2	26		
3	35		
4	42		
5	26		
6	32		
7	42		
8	42		
9	42		

$LLD_{95} = \left\{ \left(\frac{\sqrt{38}}{0.5} \right) \times 2.96 \right\} \% = 113$ CPM

BACKGROUND STANDARD (^{14}C 0.16 µCi) 76 CPM / 9540 CPM, 2.8% eff.

Time 0.5'

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²

$LLD_{95} = \left\{ \left(\frac{\quad}{\quad} \right) \times 2.96 \right\} + \quad = \quad$ CPM

BACKGROUND STANDARD ( ) _____

COMMENTS:

Monaco

RADIATION SPCL.

11-16-04

DATE

NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY

DATE 11-11-04 LOCATION MB ROOM 226

INSTRUMENT Packard LSC 2200 CA

SERIAL NO. Ø36755

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
1	4	LLD95	ND
2	5	↓	↓
3	6		
4	5		
5	5		
6	5		
7	10	23	0.38
8	5	LLD95	ND
9	3	↓	↓

$LLD_{95} = \{(\text{BKG}) \times 2.96\} + = 7$ CPM

BACKGROUND STANDARD (^3H) 4 CPM / 64,179 DPM — 56,056 DPM — 87% eff

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
	16	LLD95	ND
	13	↓	↓
	18		
	14		
	14		
	13		
	14		
	11		
	10	↓	↓

$LLD_{95} = \{(\text{BKG}) \times 2.96\} + = 30$ CPM

BACKGROUND STANDARD (^{14}C) 22 CPM / 84,000 DPM — 85,603 dpm — 102% eff

COMMENTS:

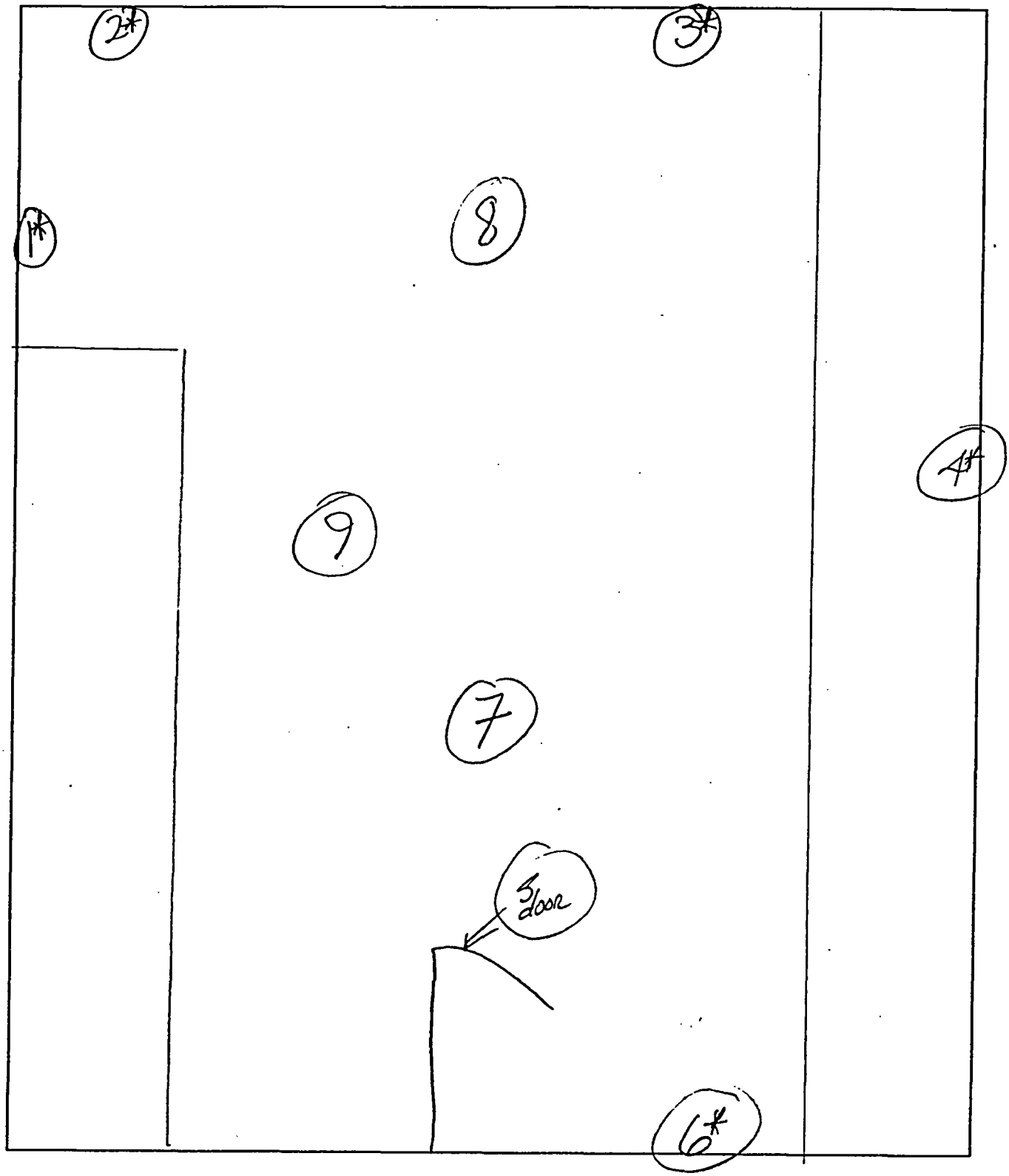
RADIATION SPCL. — DATE 11-18-04

NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY MAP

LOCATION MB ROOM 226



226

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Corvallis Environmental Research Laboratory

SUBJECT: Decommissioning of Room 226 with Regards to Use as a Radioisotope Handling Space

DATE: May 6, 1980

FROM: Ron Riley Ron Riley

TO: Milt Feldman, RSO

1. Room 226 has been vacated.

2. Representative 10cm^2 areas of bench space$^{(B)}$, floors$^{(F)}$, walls$^{(W)}$, ceiling$^{(C)}$, and sinks$^{(S)}$ were swiped with absorbent pads (Fig. 1). The pads were assayed for radioactivity by standard liquid scintillation counting procedures (Table 1).

3. Based on the results of #2, the room is considered, in my opinion, to be free of surface contamination as defined by the "CERL Radiation Rules and Regulations", Section 10.

cc: Frank Stay
Bob Trippel
Dave Specht
Tamotsu Shiroyama
Ron Gordon

Bruce
do a few
swipes to check this
and send
me a memo
MF

Special Survey 80-6

226

REMOVABLE CONTAMINATION LEVELS (SMEARS)*

B D Pickett — Surveyor

Release Survey rm 226 — Purpose of Survey

5/9/80 — Date

	1	2	3	4	5	6	7	8
Location	BKG	Gross β cpm w/ ^3H	Net β cpm w/ ^3H	Gross β cpm w/o ^3H	Net β cpm w/o ^3H	Net β μCi w/o ^3H	Net ^3H cpm	Net ^3H μCi
#226 Door	45.6	48.0	< LLD 2.4	—	—	—	—	—
" Drain	45.6	47.8	< LLD 2.2					
" Sink	45.6	46.2	< LLD 0.6					
" Bench	45.6	47.4	< LLD 1.8					

* No smearing efficiency value is factored into these results.

Instrument used: NMC GFPC # I

$LLD_{(95\%)}$ = 14.1 cpm = $4.66 \frac{\sqrt{228}}{5}$

$LLD_{(\beta \text{ w/o } ^3H)}$ in μCi = _____ μCi

$LLD_{(^3H)}$ in μCi = _____ μCi

USE REVERSE SIDE FOR CALCULATIONS

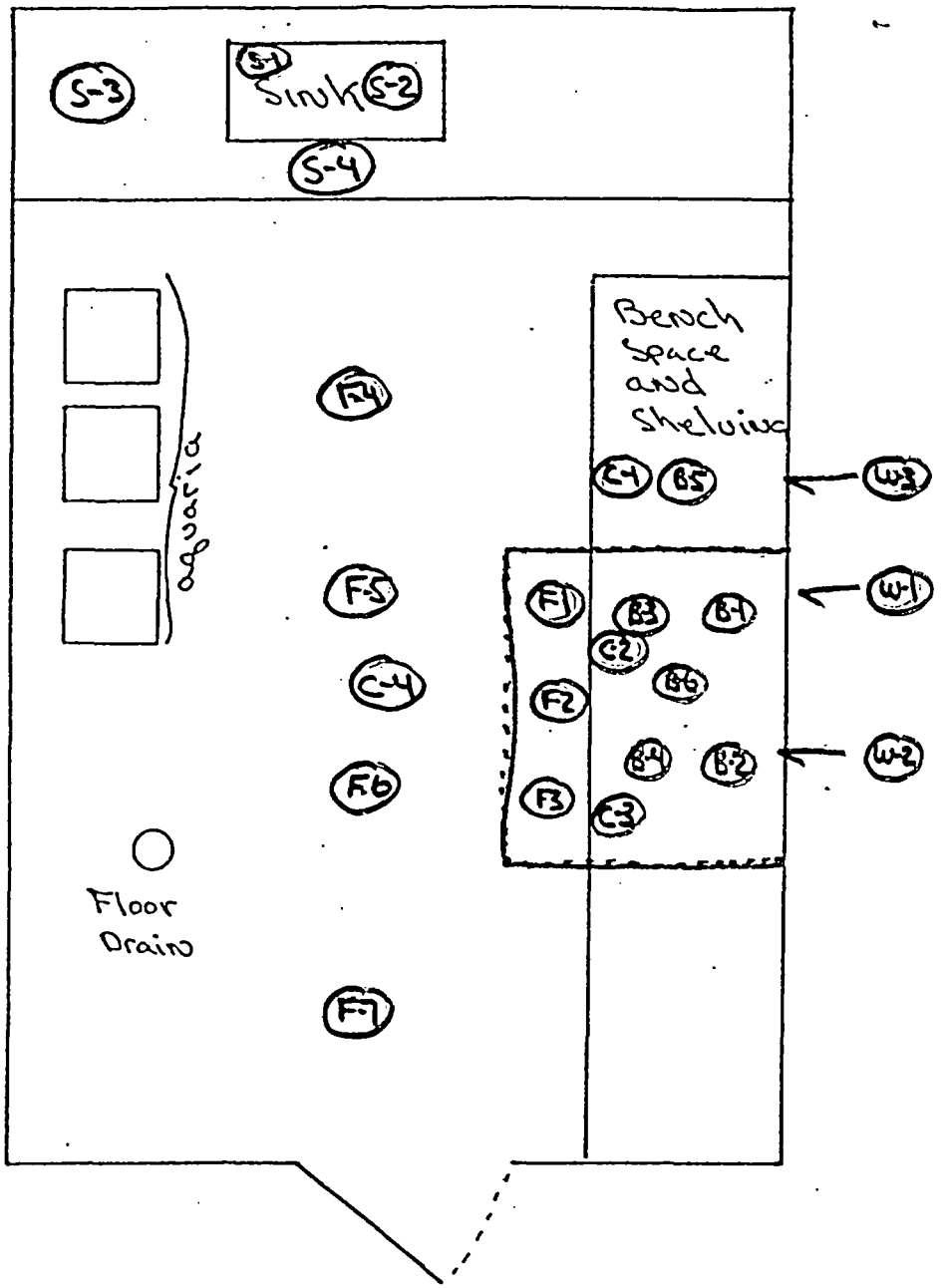


Fig. 1. Floor plan, Room 226. Area indicated in red is area designated for handling of radioisotopes. Areas assayed for radioactivity are presented. Please refer to text of memo for explanation. Also, envision room as 3-D space for correct interpretation.

TABLE 1 - Ten minute counts of surface swipes. 5/6/80 226

176 [illegible] 7-5	25-1 7-5	— Blk-1
177 22-1 7-5	23-8 7-5	— F-1
180 25-9 7-5	24-4 7-5	— F-2
181 21-8 7-5	23-1 7-5	— F-3
182 23-8 7-5	25-3 7-5	— F-4
183 20-7 7-5	23-7 7-5	— F-5
184 22-6 7-5	22-2 7-5	— F-6
185 24-7 7-5	23-6 7-5	— F-7
186 23-9 7-5	25-0 7-5	— B-1
187 24-9 7-5	22-1 7-5	— B-2
188 22-9 7-5	24-0 7-5	— B-3
189 23-7 7-5	22-8 7-5	— B-4
190 22-7 7-5	24-0 7-5	— B-6
191 26-2 7-5	26-0 7-5	— ~~S-1~~ B-7
192 24-2 7-5	22-1 7-5	— ~~S-2~~ S-1
193 25-2 7-5	23-2 7-5	— ~~S-3~~ -S-2
194 26-1 7-5	21-5 7-5	— ~~S-4~~ S-3
195 21-2 7-5	22-5 7-5	— ~~W-1~~ S-4
196 25-0 7-5	23-1 7-5	— ~~W-2~~ W-1
197 27-5 7-5	25-5 7-5	— ~~W-3~~ W-2
198 24-0 7-5	22-9 7-5	— ~~C-1~~ W-3
199 23-3 7-5	23-6 7-5	— ~~C-2~~ C-1
200 23-0 7-5	21-5 7-5	— ~~C-3~~ C-2
1 24-9 7-5	23-8 7-5	— ~~C-4~~ C-3
2 24-1 7-5	22-0 7-5	— C-4
3 25-0 7-5	23-1 7-5	Blk-2

U.S. Environmental Protection Agency
Western Ecology Division

NRC Radioactive Materials License No. 36-12343-02 Termination and Facility Decommissioning

Date: **November 27, 2004**
Subject: **Room Survey: Main Building 228 Final Contamination Survey.**

Description and Historic Use:

Double lab (450 ft^2). Hydrogen-3 and carbon-14 tracers, and nickel-63 and hydrogen-3:scandium sealed sources. No isotope use since1991. There is no record of leakage of any sealed sources used in this area.

Surveys:

Total (fixed + removable) and removable contamination surveys were conducted in MB 228 in November 2004. All points surveyed for total contamination (16) demonstrated no contamination. Sixteen points were swiped for removable contamination. Eight swipes indicated very low levels of tritium contamination (0.23 – 0.88 Bq/100 cm2). All other sampling points were at background. This area meets the contamination criteria for unrestricted use based upon the isotopes used at our facilities.

This area meets the contamination criteria for unrestricted use based upon the isotopes used at our facilities. A HVAC duct swipe was also made in November 2004 which detected 0.42 Bq/100 cm^2 of carbon-14.

Records for this room clearly demonstrate that contamination surveys were regularly performed, the area was not subject to any significant contamination events, and the room was maintained as a contaminate-free area. We determined it was unnecessary to conduct further contamination surveys in this area given these survey results and the Western Ecology Division's historic management of radioactive material use in this area. Records of the most recent historic surveys (i.e. prior to the final decommissioning surveys) of MB 228 are included in this report.

The survey for total contamination was conducted using a Ludlum Model 3 Survey Meter equipped with a Ludlum Model 44-9, 12-cm^2 thin-window Geiger-Muller pancake detector. Removable contamination was determined using methanol-wetted swipes counted in a Packard 2200 CA dual channel Liquid Scintillation Counter.

NHEERL-WED

LOG NO. 4-23

RADIATION AREA SURVEY

FIXED SURVEY

DATE 11-11-04 LOCATION MB ROOM 228

INSTRUMENT Ludlum 2000 Scaler PAnscale Probe 44-9

SERIAL NO. 83810 / PR070834

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
1	26	LLD95	ND
2	32		
3	54		
4	54		
5	29		
6	26		
7	46		
8	60		
9	44		
10	50		
11	35		
12	35		
13	56		
14	38		
15	35		
16	32		

$LLD_{95} = \left\{\left(\frac{\sqrt{38}}{0.5}\right) \times 2.96\right\} + 76 = 113$ CPM

BACKGROUND STANDARD (^{14}C 0.16 µCi) 19540 CPM 2.8% eff.

Time 0.5'

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²

$LLD_{95} = \left\{\left(\quad\right) \times 2.96\right\} + \quad = \quad$ CPM

BACKGROUND STANDARD ( )

COMMENTS:

D Monaco

RADIATION SPCL.

11-11-04

DATE

NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY

DATE 11-11-04 LOCATION MB ROOM 228

INSTRUMENT Packard LSC 2200CA

SERIAL NO. Ø36755

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
1	7	14	0.23
2	9	20	0.33
3	12	30	0.50
4	4	<LLD95	ND
5	8	17	0.28
6	20	53	0.88
7	6	<LLD95	ND
8	6	↓	ND
9	6	↓	ND
10	17	49	0.82
11	6	<LLD95	ND
12	2	↓	ND
13	6	↓	ND
14	1	14	0.23
15	1	14	0.23
16	5	<LLD95	ND

$LLD_{95} = \{(\text{--------}) \times 2.96\} + = 7$ CPM

BACKGROUND STANDARD (^3H 64,179 dpm) 4 CPM 56,052 DPM

87% eff.

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
	12	<LLD95	ND
	11	↓	↓
	12	↓	↓
	14	↓	↓
	12	↓	↓
	12	↓	↓
	11	↓	↓
	14	↓	↓
	14	↓	↓
	12	↓	↓
	15	↓	↓
	12	↓	↓
	16	↓	↓
	10	↓	↓
	13	↓	↓
	14	↓	↓

$LLD_{95} = \{(\text{--------}) \times 2.96\} + = 30$ CPM

BACKGROUND STANDARD (^{14}C 84,000 dpm) 22 CPM 85,603 DPM

102% eff.

COMMENTS:

Q Monaco
RADIATION SPCL.

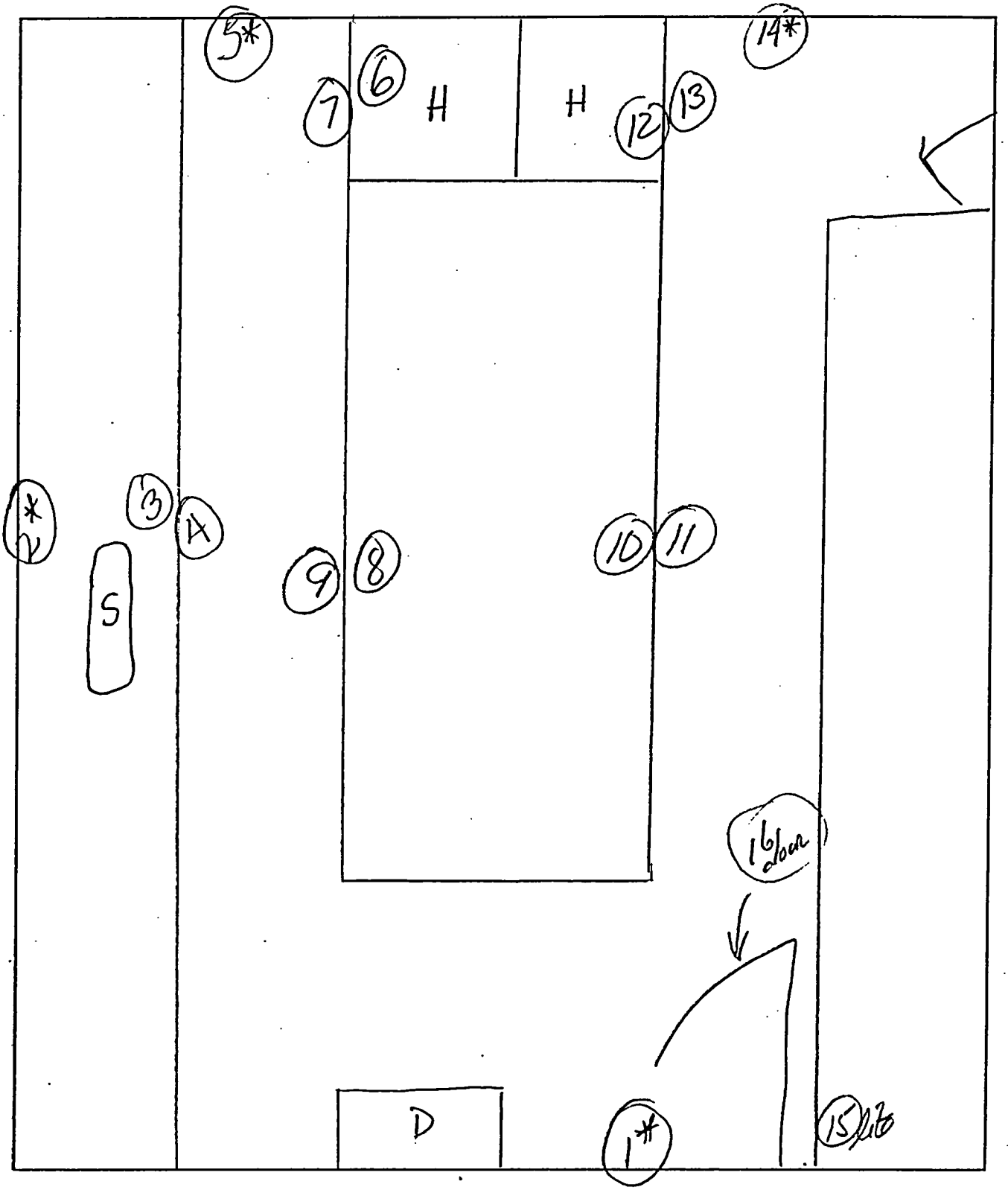
11-18-04
DATE

NHEERL-WED

LOG NO. 4-23

RADIATION AREA SURVEY MAP

LOCATION MB ROOM 228



U.S EPA
ENVIRONMENTAL RESEARCH LABORATORY -CORVALLIS
RADIATION CONTAMINATION SURVEY

Log No. 91-36
1/3

11-4-91 Type of Survey: Removable Contamination. 228

s): S^{35}, GST ^{14}C ^{3}H

^{3}H = 4.1 cpm
^{14}C = 10.3 cpm

Background Counts: 0 ± CPM Total Count Time (min.): 10'

Limits of Detection: $^{3}H = (\sqrt{41}/10)\times 466 = 3$ $^{14}C = (\sqrt{103}/10)\times 4.66 = 5$ cpm

ment Used: ☐ GFPC ☒ LSC ☐ Ion Chamber ☐ GM ☐ Scintillation Model: PACKARD 2200 S/N:

314 123, 954 dpm 7%

round: CPM±SD DPM±SD Standard (^{14}C 85,428 2%): % Error

Room No.	Swipe Description	Nuclide: 3H per 100 cm² CPM±SD	Net DPM	Net Activity pCi	Nuclide: 14C per 100 cm² CPM±SD	Net DPM	Net Activity
130	Hood Sill	3	7	3.2 pCi	3	<LLD95	N/A
	SASH	0	0	N/A	2		
	Floor	0	0		2		
	N. Counter	0	0		0	0	
	S. Counter	0	0		2	<LLD95	
	door	0	0		0	0	
232	S. Hood sill	4	13	5.9 pCi	1	<LLD95	
	SASH	2	<LLD95	N/A	0	0	
	Floor	0	0		4	<LLD95	
	N Hood sill	2	<LLD95		4		
	SASH	1	1		1		
	Floor	0	0		0	0	
	desk	0	0		1	<LLD95	
	Phone	1	<LLD95		0	0	
	Floor	0	0		0	0	
	counter	0	0		1	<LLD95	
	door	0	0		0	0	
228	S Hood SASH	2	<LLD95		0	0	
	sill	1	<LLD95		0	0	
	Floor	0	0		0	0	

ents:

Chris S. Mon
tion Safety Date

(9/90)

U.S EPA
ENVIRONMENTAL RESEARCH LABORATORY -CORVALLIS

Log No. _____

RADIATION CONTAMINATION SURVEY

2/3

11-4-91 Type of Survey: _____

s): _____

ss Background Counts: _____ ± _____ CPM Total Count Time (min.): _____

er Limits of Detection: _____ = _____ cpm

nstrument Used: ☐ GFPC ☐ LSC ☐ GM ☐ Ion Chamber ☐ Scintillation Model: _____ S/N: _____

ckground: _____ CPM±SD _____ DPM±SD Standard (_____): _____ % Error

ipe No.	Room No.	Swipe Description	Nuclide: _____ per 100 cm²		pCi	Nuclide: _____ per 100 cm²		
			CPM±SD	Net DPM	Net Activity	CPM±SD	Net DPM	Net Activity
12	228	Hood Floor	0	0	N/A	0	0	N/A
23		Floor	0	0		0	0	
14	256	door	1	<LLD95		0	0	
25		Phone	3	8	3.6 pCi	0	0	
26		Counter	2	<LLD95	N/A	3	<LLD95	
27		Desk	0	0	N/A	0	0	
		LSC	3	7	3.2 pCi	4	<LLD95	
29		hood ~~SILL~~	1	<LLD95	N/A	3	<LLD95	
30		Floor ~~sill~~	1	<LLD95		0	0	
31	258	Hood ~~sill~~	0	0		6	7	3.2 pCi
32		Floor	1	<LLD95		3	<LLD95	
33		LSC	1	<LLD95		3	<LLD95	
34		door	3	7	3.2 pCi	0	0	
35	TOFF 113	TABLE	0	0	N/A	3	<LLD95	
36		Sink counter	0	0		0	0	
37		Floor	0	0		0	0	
38		door	0	0		2	<LLD95	
39		TABLE	0	0		2	<LLD95	
40		Floor	0	0		4	<LLD95	

miss

_____ /

Radiation Safety Date:

(9/90)

91-2

1/2

AREA CONTAMINATION SURVEY SHEET

NON-REMOVABLE CONTAMINATION

Radionuclide(s) Surveyed: β & γ

Date: 1/3/91

Method of Detection: G-M S/N ~~22977~~ 77222 pm

Radiation Safety Technician

Swipe #	Location RM #	Area	Nuclide: β + γ NET CPM / 100cm²	NET DPM	µCi	Nuclide: γ NET CPM	NET DPM	µCi
		BKGD	(125)					
	~~228~~	STANDARD (Check Source 11K)	11,000					
	MB 228	S. Hood INSIDE	Ø	N/A	N/A			
		outside	Ø					
		Slate Desk	Ø					
		Floor	Ø					
		Counter S.	Ø					
		Freezer Outside S.	Ø					
		Freezer Inside S.	800 pm	32,000 ~~40000~~	0.017 ~~0.014~~	Ø	N/A	N/A
		Refrigerator (Out) N.	Ø	N/A	N/A			
		Refrigerator (IN) N.	900 ~~1000~~	36,225 ~~45000~~	0.016 ~~0.020~~	Ø	N/A	N/A
		Drying oven (IN)	Ø	N/A	N/A			
		Drying oven OUT	Ø					
		N. Hood (OUT)	Ø					
		N. Hood IN	Ø					

Calculation of Lower Limits of Detection (LLD)

	Nuclide:	Nuclide:
Gross Background Counts:		
Total Background Count time:		

$$LLD\ (95\%) = \sqrt{\frac{\text{Gross Background Counts}}{\text{Count Time}}} \times 4.66$$

LLD (95%)= | |

REMARKS:

2/2

AREA CONTAMINATION SURVEY SHEET

Radionuclide(s) Surveyed: ________________ Date: __________

Method of Detection: ________________

____
Radiation Safety Technician

Swipe #	Location RM #	Location Area	Nuclide: β & γ NET CPM	NET DPM	µCi	Nuclide: γ NET CPM	NET DPM	µCi	
	MB 22X	Wall by N. Hood	Ø	N/A	N/A				
		Floor	Ø	↓	↓				
		Counter	Ø	↓	↓				
		Hood Cabinet	Ø	↓	↓				
		(DM)							
		^{14}C 0.168 µCi Source	13000 ~~7750~~		0.006 ~~0.0034~~	4% eff. ~~2% eff.~~			

Calculation of Lower Limits of Detection (LLD) Nuclide: _______ Nuclide: _______

Gross Background Counts: _______ _______

Total Background Count time: _______ _______

$$LLD\ (95\%) = \sqrt{\frac{\text{Gross Background Counts}}{\text{Count Time}}} \times 4.66$$

LLD (95%)= _______ _______

REMARKS:

91-1 1/3

AREA CONTAMINATION SURVEY SHEET
Removable Contamination MB228

Radionuclide(s) Surveyed: ^{3}H, ^{14}C & ^{35}S Date: 1/3/91

Method of Detection: LSC

O.A. Mon
Radiation Safety Technician

Swipe #	Location RM #	Area	Nuclide: 3-H NET CPM	NET DPM	pCi ~~uCi~~	Nuclide: 14-C NET CPM	NET DPM	pCi ~~uCi~~
		BKGRD	10.2	N/A	N/A	13.3	N/A	N/A
	228	S Hood Sash	0	N/A	↓	0	N/A	↓
		" Sill	0	N/A		0	N/A	
		Hood Floor	0	N/A		0	N/A	
		" Walls	0	N/A		3	N/A	
		" Fixtures	0	N/A	↓	0	N/A	↓
		Hood Cup sinks	5	19	9	6	6	3
		Hood Frame	75	265	119	4	0	N/A
		Floor in front of hood	13	58	26	7	5	3
		SS Slide rack	0	N/A	N/A	5	7	3
		Lucite hood	0	N/A	N/A	4	0	N/A
		South refer out	0	N/A	N/A	15	19	9
		South refer in	15	17	8	77	95	43
		S. refer in	16	16	8	87	108	49
		S refer in racks	25	27	12	122	151	68

Calculation of Lower Limits of Detection (LLD)

	Nuclide: ^{3}H	Nuclide: ^{14}C
Gross Background Counts:	102	133
Total Background Count time:	10'	10'

$$LLD\ (95\%) = \frac{\sqrt{\text{Gross Background Counts}}}{\text{Count Time}} \times 4.66$$

LLD (95%)=	5	5

REMARKS:

AREA CONTAMINATION SURVEY SHEET

Radionuclide(s) Surveyed:_____ Date:_____

Method of Detection:_____

_____
Radiation Safety Technician

Swipe #	Location RM #	Area	Nuclide: NET CPM	NET DPM	pCi ~~uCi~~	Nuclide: NET CPM	NET DPM	pCi ~~uCi~~	
		S refer main cool Room	155	250	113	607	743	335	
		Lucite (Floor)	2	0	N/A	22	28	13	
		Refer NORTH inside	3	0		19	24	11	
		Refer NORTH outside	0	0		14	18	8	
		Refer NORTH outside	0	0		9	11	5	
		Refer NORTH inside	2	0		38	49	22	
		~~Cab~~ NORTH Bench	0	0		10	14	6	
		~~Hood~~ Hood NORTH SASH	0	0		5	6	3	
		Hood NORTH Sill	0	N/A		2	0	N/A	
		Hood FLOOR	0	N/A		3	0	N/A	
		Hood FLOOR	0	0		2	0	N/A	
		Hood WALL	3	0		40	57	23	
		Hood WALL	0	0		8	11	5	
		Hood Cabinet	32	122	55	9	4	2	
		FLOOR	0	0	N/A	5	7	3	

Calculation of Lower Limits of Detection (LLD) Nuclide:_____ Nuclide:_____

Gross Background Counts: _____ _____
Total Background Count time: _____ _____

$$LLD\ (95\%) = \frac{\sqrt{\text{Gross Background Counts}}}{\text{Count Time}} \times 4.66$$

LLD (95%)= _____ _____

REMARKS:

AREA CONTAMINATION SURVEY SHEET

Radionuclide(s) Surveyed:_____ Date:_____

Method of Detection:_____

_____
Radiation Safety Technician

Swipe #	Location RM #	Area	Nuclide: NET CPM	NET DPM	pCi ~~uCi~~	Nuclide: NET CPM	NET DPM	pCi ~~uCi~~	
		drying oven	71	276	124	2	0	N/A	
		drying oven	0	N/A	N/A	0	N/A	N/A	
		drying oven	0	N/A	N/A	1	N/A	N/A	
		door	0	N/A	N/A	7	8	4	
		3-H 314±2	~~233~~ 109	233		104	109		
		3-H 2602±90	~~2483~~ 1049	2483		266	130		
		3-H 25,165±407	~~24415~~ 10178	24415		1864	361		
	STANDARDS	3-H NEN	~~64705~~ 6470S	135582		10153	109		
		14-C 121 dpm	9	0		95	118		
		14-C 1,951±40	127	0		1006	1233		
		14-C 11,055±130	1015	0		8776	10761		
		14-C NEN 84,000	8964	396		70956	84247		

Calculation of Lower Limits of Detection (LLD) Nuclide:_____ Nuclide:_____

Gross Background Counts: _____ _____

Total Background Count time: _____ _____

LLD (95%)= $\sqrt{\frac{\text{Gross Background Counts}}{\text{Count Time}}}$ x 4.66

LLD (95%)= _____ _____

REMARKS:

228 90-28

1/

AREA CONTAMINATION SURVEY SHEET

Radionuclide(s) Surveyed: ^{51}Cr Date: 7-6-90

Method of Detection: LSC-460 Radiation Safety Technician

Swipe #	Location RM #	Area	Nuclide: ^{3}H NET CPM	NET DPM	µCi	Nuclide: ^{14}C, ^{51}Cr, ^{35}S NET CPM	NET DPM	µCi
1		BKGRD	7.8	—	N/A	12	—	N/A
2	130	Counter	1	<		1	<	
3		Counter	0	N/A		0	N/A	
4		Floor	0	N/A		3	<	
5		Floor	0	N/A		0	N/A	
6		Desk	1	<		0	N/A	
7		Door	0	N/A	↓	5	6	↓

Calculation of Lower Limits of Detection (LLD)

	Nuclide: ^{3}H	Nuclide: ^{14}C, ^{51}Cr, ^{35}S
Gross Background Counts:	100	120
Total Background Count time:	10'	10

$$(95\%) = \sqrt{\frac{\text{Gross Background Counts}}{\text{Count Time}}} \times 4.66$$

LLD (95%)=	5	5

REMARKS:

AREA CONTAMINATION SURVEY SHEET

Radionuclide(s) Surveyed:_____ Date:_____

Method of Detection:_____

_____
Radiation Safety Technician

Swipe #	Location RM #	Area	Nuclide: NET CPM	NET DPM	pCi	Nuclide: NET CPM	NET DPM	pCi	
41	236	Counter Dark Room	0	N/A	N/A	3	<LLD	N/A	
42		Floor Dark Room	0			4	<LLD		
43		N Hood SASH	0			3	<LLD		
44		Sill	0			0	N/A		
45		Floor	0			1	<LLD		
46	230(b)	DESK	0			0	N/A		
47		Phone	0	↓	↓	1	<LLD		
48		Floor	7	32	15	4	<LLD		
49	228	N Hood Sill	0	N/A	N/A	1	<LLD		
50		SASL	0			0	N/A	↓	
51		Floor	0	↓		8	11	5	
52		S Hood Sill	3	~~4~~ LLD		6	8	4	
53		SASH	0	N/A		0	<LLD/A	N/A	
54		Floor	0			0	N/A		
55	294	Hood SASH	0	↓	↓	3	<LLD	↓	

Calculation of Lower Limits of Detection (LLD) Nuclide:_____ Nuclide:_____

Gross Background Counts: _____ _____

Total Background Count time: _____ _____

$$(95\%) = \sqrt{\frac{\text{Gross Background Counts}}{\text{Count Time}}} \times 4.66$$

LLD (95%)= _____ _____

REMARKS:

90-22 1/3

AREA CONTAMINATION SURVEY SHEET

228

Radionuclide(s) Surveyed: ^{35}S ^{14}C ^{3}H Date: 5·18·90

Method of Detection: LSC 460

3H

P.A. Moore
Radiation Safety Technician

14C

Wipe #	Location RM #	Area	Nuclide: NET CPM	NET DPM	μCi		Nuclide: NET CPM	NET DPM	pCi ~~dpm~~	
1		BKGRD	(12)	(31)	N/A		(15)	(17)	N/A	
2	294	hood sill	46	51		→ *	230	288	153	^{35}S
3		hood SASH	~~70~~ 5	< LLD$_{95}$	N/A		34	43	19 ~~22~~	
4		Room Floor (hood)	1048	1762		→	3487	4278	2721	
5		W Room Floor	4756	9114		→	14,508	17,786	12,117	
6		N Room Floor	373	663		→	1256	1548	996	
7		S Room Floor	448	747		→	1570	1962	1,220	
8		Refer	27	39		→	111	138	78	
9		Freezer	12	15		→	54	67	37	
10		phone	10	5		→	63	79	38	
11		DOOR	16	30		→	54	67	44	
12		Room Floor (DOOR)	121	293		→	283	343	286	^{35}S EOD
13	258	Hood Sill	1	< LLD$_{95}$	N/A		1	< LLD$_{95}$	N/A	
14		Hood SASH	Ø net	< LLD$_{95}$	N/A		5	< LLD$_{95}$	N/A	
15		Floor (E)	Ø net	< LLD$_{95}$	N/A		Ø net	N/A	N/A	

Floor will be decontaminated

Calculation of Lower Limits of Detection (LLD) Nuclide: _____ Nuclide: _____

Gross Background Counts: _____ _____

Total Background Count time: _____ _____

$$(95\%) = \sqrt{\frac{\text{Gross Background Counts}}{\text{Count Time}}} \times 4.66$$

LLD (95%)= 9 10

REMARKS: * Since no ^{3}H is used in 294, dpm from the low energy range were added to ... ^{14}C ...

AREA CONTAMINATION SURVEY SHEET

Radionuclide(s) Surveyed: _____ Date: 5-18-90

Method of Detection: _____

Radiation Safety Technician

Wipe #	Location RM #	Location Area	Nuclide: NET CPM	Nuclide: NET DPM	pCi/~~uCi~~	Nuclide: NET CPM	Nuclide: NET DPM	pCi/~~uCi~~	
31	236	hood sash	Ø net	N/A	N/A	6	<LLD	N/A	
32		hood sill	Ø net	N/A	N/A	Ø net	N/A	N/A	
33		Floor	Ø net	N/A	N/A	Ø net	N/A	N/A	
34		Desk	Ø net	N/A	N/A	Ø net	N/A	N/A	
35		Door	Ø net	N/A	N/A	3	<LLD	N/A	
36		N Hood sash	Ø net	N/A	N/A	Ø net	N/A	N/A	
		hood sill	20	58	26	23	27	12	
38		Floor	Ø net	N/A	N/A	Ø net	N/A	N/A	
39	228 b	Floor	Ø net	N/A	N/A	Ø net	N/A	N/A	
40		Desk	2	<LLD	N/A	1	<LLD	N/A	
41		Phone	Ø net	N/A	N/A	5	<LLD	N/A	
42	228	S hood sash	Ø net	N/A	N/A	Ø net	N/A	N/A	
43		hood sill	Ø net	N/A	N/A	Ø net	N/A	N/A	
44		Floor	Ø net	N/A	N/A	Ø net	N/A	N/A	
45		Door	2	<LLD	N/A	6	<LLD	N/A	

Calculation of Lower Limits of Detection (LLD) Nuclide: _____ Nuclide: _____

Gross Background Counts: _____ _____

Total Background Count time: _____ _____

(%)= $\sqrt{\frac{\text{Gross Background Counts}}{\text{Count Time}}}$ x 4.66

(95%)= _____ _____

REMARKS:

U.S. Environmental Protection Agency
Western Ecology Division

NRC Radioactive Materials License No. 36-12343-02 Termination and Facility Decommissioning

Date: **November 27, 2004**
Subject: **Room Survey: Main Building 232 Final Contamination Survey.**

Description and Historic Use:

Single instrument lab (225 ft^2). Hydrogen-3 and carbon-14 tracers, and nickel-63 and hydrogen-3:scandium sealed sources. This room was decommissioned as a unrestricted area on February 10, 1999. No isotope use since1999. There is no record of leakage of any sealed sources used in this area.

Surveys:

Total (fixed + removable) and removable contamination surveys were conducted in MB 232 at the time of restricted use decommissioning. The decommissioning records are enclosed. All points surveyed demonstrated no significant contamination. This area meets the contamination criteria for unrestricted use based upon the isotopes used at our facilities.

Records for this room clearly demonstrate that contamination surveys were regularly performed, the area was not subject to any significant contamination events, and the room was maintained as a contaminate-free area. We determined it was unnecessary to conduct further contamination surveys in this area given these survey results and the Western Ecology Division's historic management of radioactive material use in this area. Records of the most recent historic surveys (i.e. prior to the final decommissioning surveys) of MB 232 are included in this report.

The survey for total contamination was conducted using a Ludlum Model 2000 Scaler equipped with a Ludlum Model 44-9, 12-cm^2 thin-window Geiger-Muller pancake detector. Removable contamination was determined using methanol-wetted swipes counted in a Packard 2200 CA dual channel Liquid Scintillation Counter.

MEMO

To: Jay Gile, NHEERL RSO
From: Phil Monaco, Dynamac
Date: February 10, 1999

Subject: Decommissioning of MB 232b Instrument Lab

The Main Building Instrument Lab Room 232b was surveyed for fixed and removable radioactive contamination. The preliminary surveys found minor contamination levels (on the counter around the sink covering approximately 200 cm^2. Fixed contamination ranged from 58-104 Bq/100 cm^2. ^3H and ^{14}C removable contamination was 0.02 - 0.6 Bq/100 cm^2 and .015 - .037 Bq/ 100 cm^2 respectively. Contamination levels greater than 1.6 Bq/100 cm^2 were consider unacceptable necessitating decontamination.

The contaminated areas were decontaminated and re-surveyed. Following decontamination, any contamination was below the lower limits of detection for removable and fixed contamination and below the 1.6 Bq/100 cm^2 action level for contamination.

82 locations were swiped or surveyed in the assessment process. The fixed and removable surveys were logged as 99-3, 99-4, 99-5, and 99-6 and placed on file in MB 190.

C: Decommissioning File

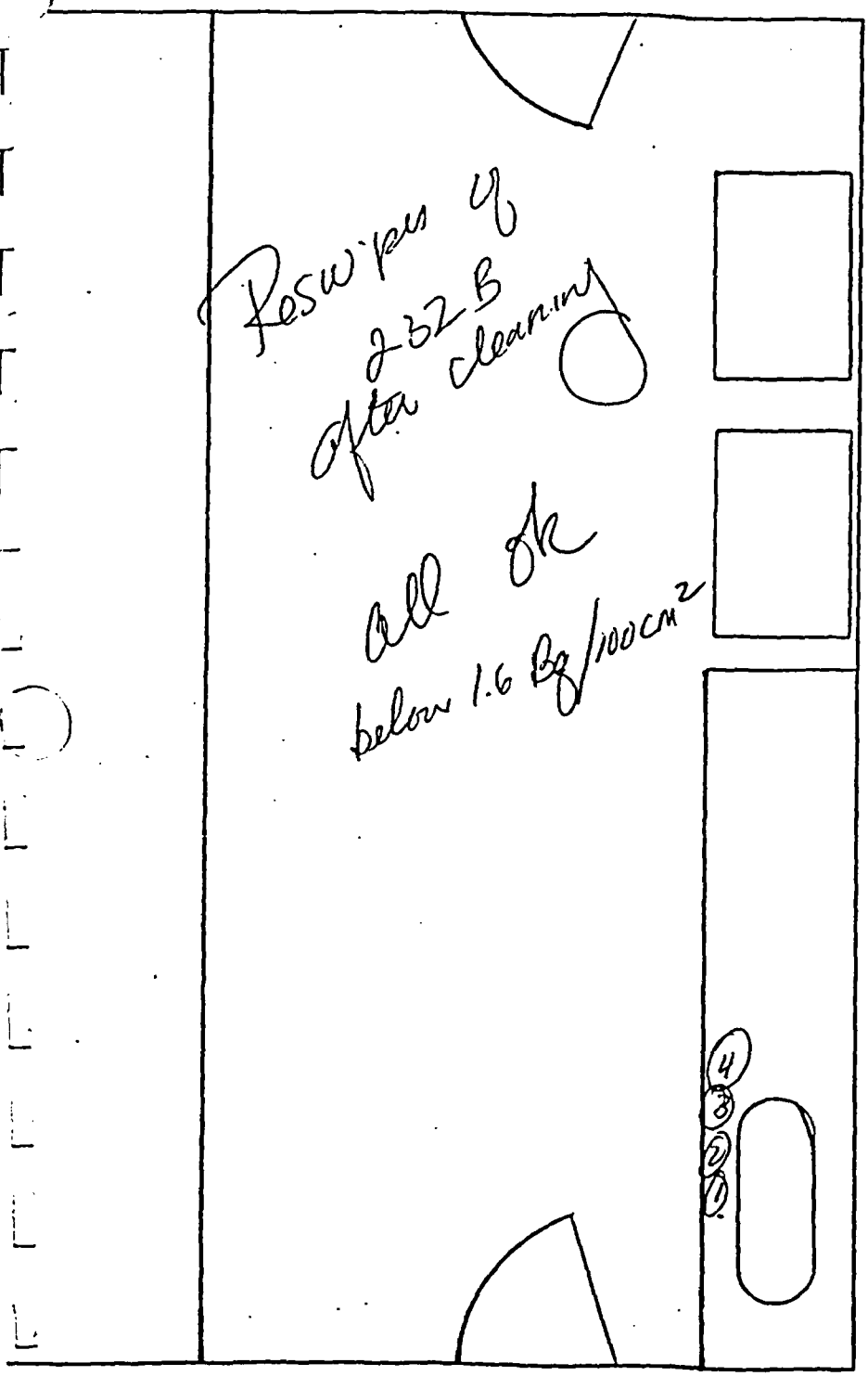
99

NHEERL-WED
RADIATION AREA SURVEY
REMOVABLE

LOG NO. 95-6

DATE 2-9-99

LOCATION MAIN BLDG ROOM 232B



SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
	3H/14C		
1	2.8/13.6	LLD95	ND
2	4.6/15.4	↓	↓
3	4.2/13.2		
4	1.8/16.2		

$LLD_{95} = \left\{\left(\sqrt{\text{See Below}}\right) X\ 2.96\right\} + = \text{CPM}$

^{14}C 17.6 ^{3}H 2.6

BACKGROUND See
STANDARD (See attached)
INSTRUMENT Packard 2200CA
SERIAL NO. 36755

^{3}H $\left(\frac{\sqrt{2.6 \times 5}}{5}\right) 2.96 + 2.6 = 4.7$ CPM

^{14}C $\left(\frac{\sqrt{17.6 \times 5}}{5}\right) 2.96 + 17.6 = 23.$ CPM

COMMENTS: ND = NOT Determined LLD95

RADIATION SPCL

2-10-99
DATE

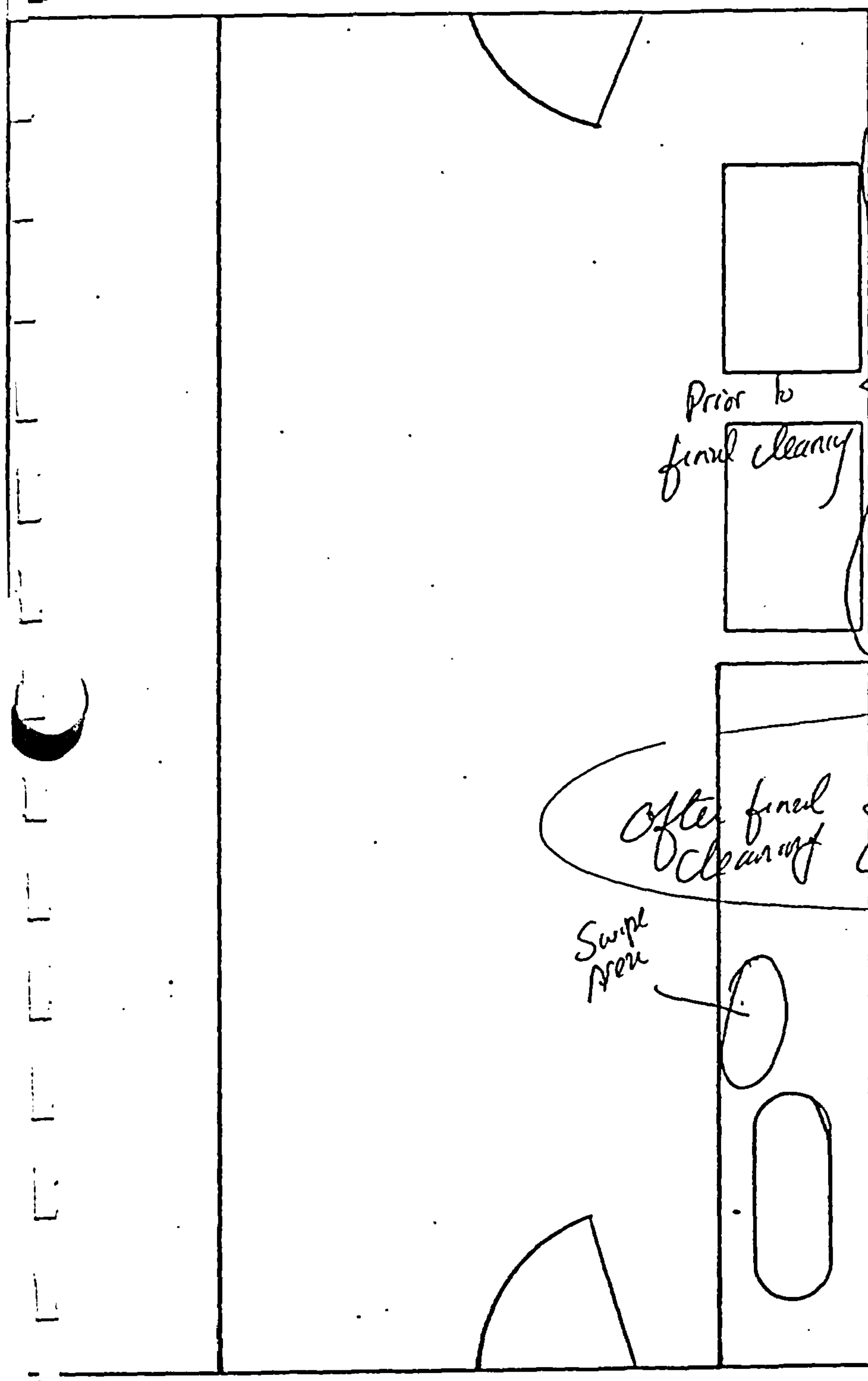
LOG NO. 99-5

NHEERL-WED
RADIATION AREA SURVEY

Fixed Contamination Survey

DATE 2-9-99

LOCATION MAIN BLDG ROOM 232B



SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM^2	
1	60	<LLD*	ND*	
2	68	<LLD95	ND	
3	92 } 79	2194 dpm	183	Resurveyed
4	58			
5	86			
6	~~82~~	<LLD95	ND	
7	~~64~~	<LLD95	ND	
8	~~68~~ } 76	2111 dpm	~~ND~~ 176	Resurveyed
9	84			
10	72 } 67	<LLD95	ND	
11	62			
12	86 } 80	2222	~~ND~~ 185	Resurveyed
13	84			
14	64	<LLD	ND	
15	64	<LLD	ND	
16	58	<LLD	ND	
~~17~~				
17	44	<LLD	ND	
18	62	<LLD	ND	
~~19~~				

$LLD_{95} = \left\{ \left(\frac{\sqrt{48}}{1} \right) \times 2.96 \right\} + = 69$ CPM

BACKGROUND ~~[illegible]~~ 48±4 n=4

STANDARD (0.168 µCi ^{14}C) 13,403 cpm

INSTRUMENT 2000/44-9

SERIAL NO. 83810/70878

3.6% eff

COMMENTS: ND* ≡ <LLD95 Not Determined

~~[illegible]~~ Activity Calcs. DPM/60s = DPS = 1Bq × $\frac{100 cm^2}{20 cm^2}$ = $\left(\frac{DPM}{60}\right)$ 5 = Bq/100 cm^2

RADIATION SPCL. [signature] DATE 2-9-99

NHEERL-WED

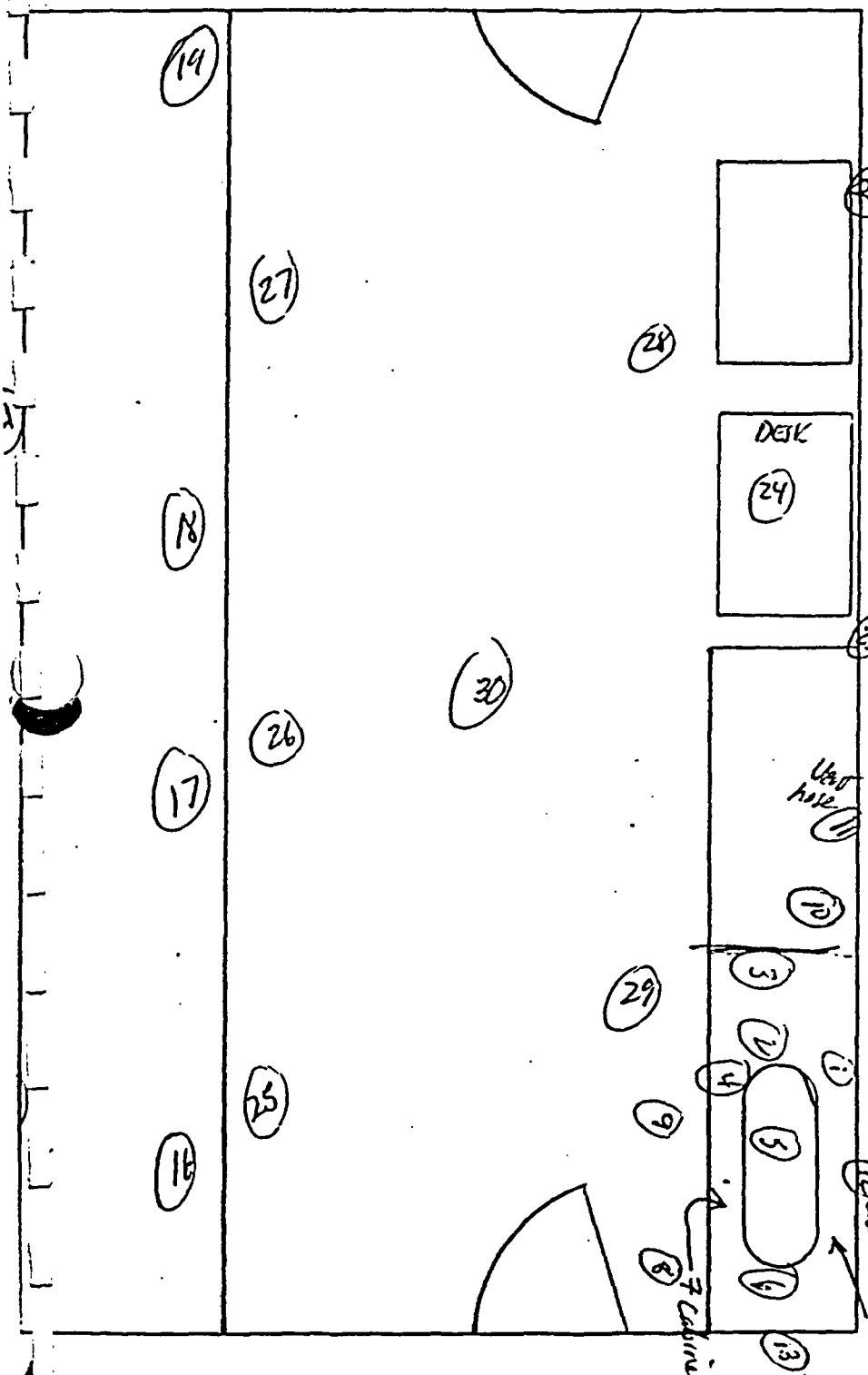
RADIATION AREA SURVEY

Fixed Contamination

LOG NO. 99-4

DATE 2-4-99

LOCATION MAIN BLDG ROOM 232B



SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²	
1	~~25~~ 50	LLD95	ND*	
2	3346	694	58	Sink area
3	3968	250	63	
4	~~3946~~	1250	104	
5	54	LLD95	ND	
6	50			
7	52			
8	58			
9	66	694	58	floor x Sink
10	60	LLD95	ND	
11	46			
12	54			
13	34			
14	60			
15	54			
16	54			
17	42			
18	52			
19	48			
20	34			
21	40			
22	42			
23	38			
24	40			
25	52			
26	54			
27	50			
28	56			
29	46			
30	46			

$LLD_{95} = \{ (41) \times 2.96 \} / 4\pi = 60$ CPM

BACKGROUND 41 CPM

STANDARD (^{14}C 0.168 μCi) 13294 CPM 3.6%

INSTRUMENT 2000/44-9 Pancake

SERIAL NO. 83810/10878

Oven vent hose 46 LLD95 ND

6C vent hose 40 LLD95 ND

(CPM/60) × 5 = Bq

COMMENTS:

*ND = less than lower limit of detection, not determined.

RADIATION SPCL.

2-4-99
DATE

NHEERL-WED

RADIATION AREA SURVEY

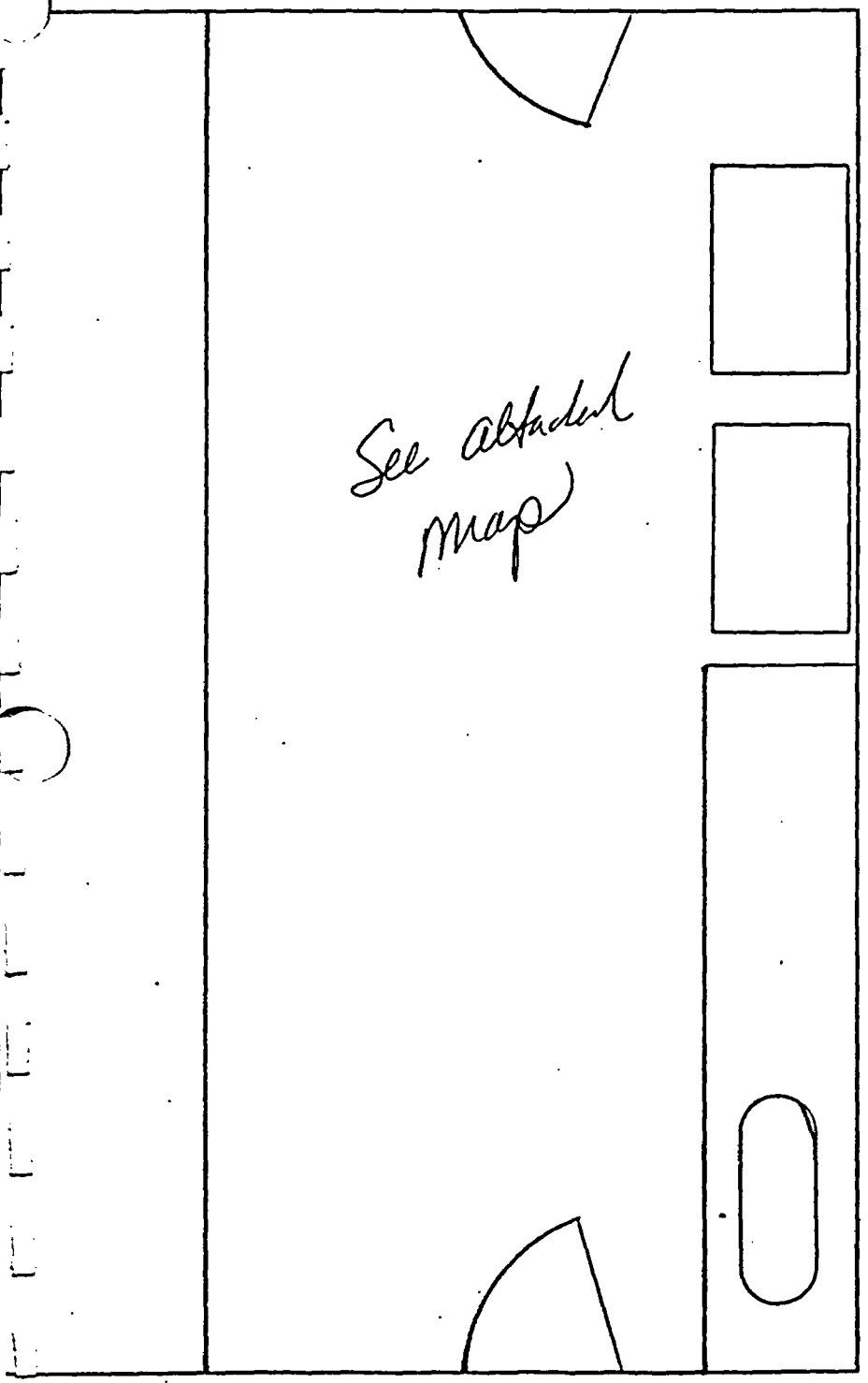
Removable Contamination

LOG NO. _____

DATE 2-4-99

LOCATION MAIN BLDG ROOM 232B

β 14C



SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
1	13	<LLD95	ND
2	19	9	0.15
3	14	<LLD95	ND
4	12		
5	11		
6	11		
7	13		
8	14		
9	13		
10	16		
11	12		
12	14		
13	15		
14	12		
15	14		
16	18		
17	*27	22	0.37
18	17	<LLD95	ND
19	*20	10	0.16
20	16	<LLD95	ND
21	14		
22	15		
23	14		
24	11		
25	11		
26	9		
27	14		
28	12		
29	12		
30	13		

$LLD_{95} = \left\{ \left(\frac{\sqrt{5 \times 13}}{5} \right) \times 2.96 \right\} + = 18$ CPM

BACKGROUND 130PM. (20DPM)

STANDARD (1'C 54K 7/16) 85,272

INSTRUMENT Packard 2000 36755

SERIAL NO. 36755

COMMENTS: *ND = NOT Determined. < LLD95. All Swipes < 1.6 Bq/100 cm²

RADIATION SPCL. _____ DATE _____

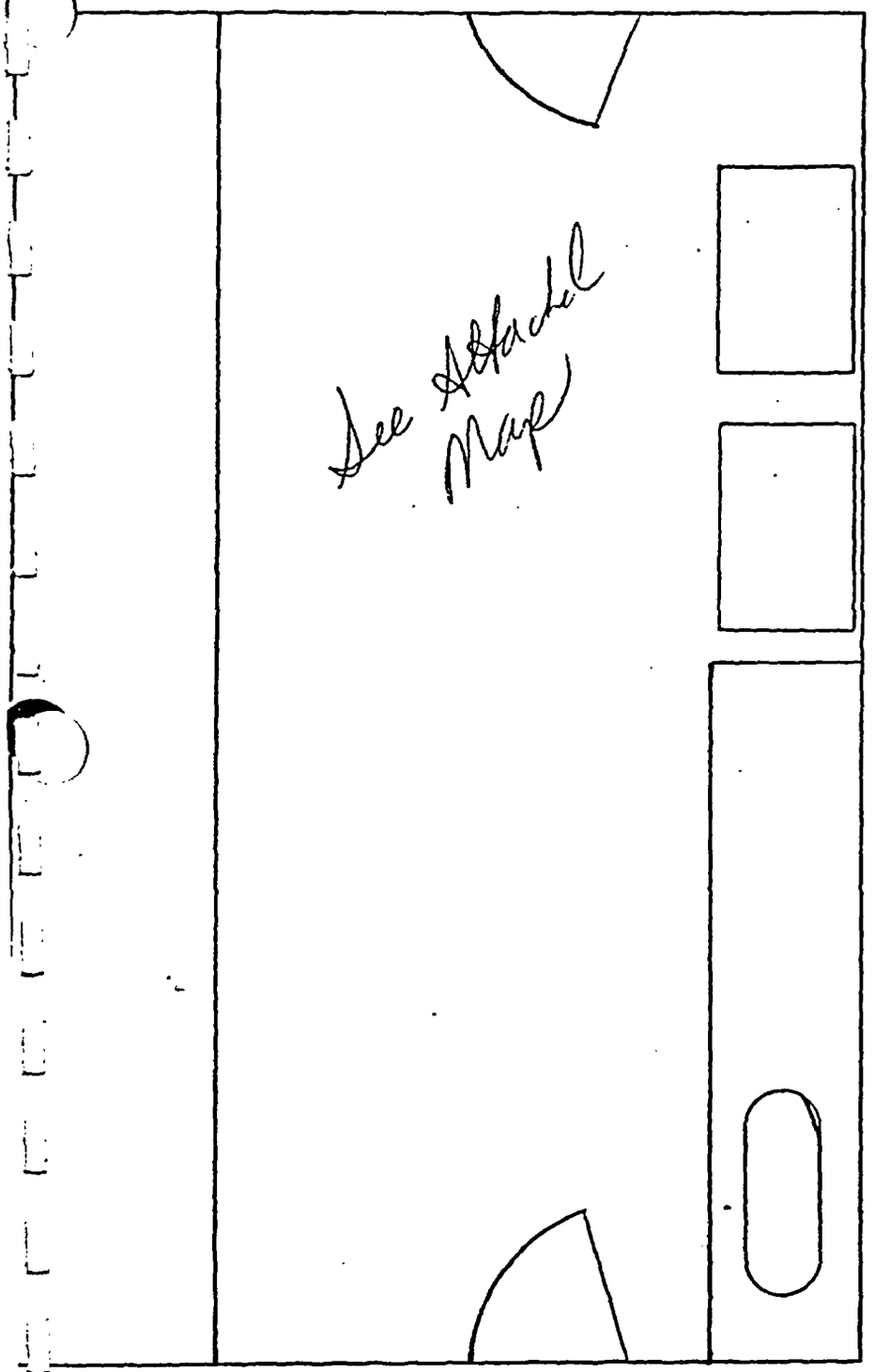
NHEERL-WED

RADIATION AREA SURVEY

DATE _____

LOCATION MAIN BLDG ROOM 232B

3H



SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
1	2.4	0	0
2	1	LLD_{95}	ND*
3	4	10	0.17
4	2	0	0
5	3	11	0.18
6	1	LLD_{95}	ND
7	2	0	0
8	3	0	0
9	1	LLD_{95}	ND
10	1	LLD_{95}	ND
11	3	10	0.17
12	3	5	0.08
13	1	LLD_{95}	ND
14	2	0	0
15	4	11	0.18
16	6	36	0.60
17	5	0	0
18	3	0	0
19	6	33	0.55
20	3	4	0.06
21	1	LLD_{95}	ND
22	3	5	0.08
23	2	0	0
24	3	10	0.17
25	3	6	0.10
26	5	33	0.55
27	3	4	0.06
28	2	1	0.02
29	3	3	0.05
30	1	LLD_{95}	ND

$LLD_{95} = \left\{\left(\frac{\sqrt{1+5}}{5}\right) \times 2.96\right\} + 1 = 2$ CPM

BACKGROUND 1.0 cpm (0 dpm)
STANDARD (Bq as dpm 4/79) 7936.6
INSTRUMENT 2000CA Packard
SERIAL NO. 36755

COMMENTS: * ND = NOT DETERMINED < LLD_{95}.
All swipes < 1.6 Bq/100cm²

RADIATION SPCL. _____ DATE _____

NHEERL-WED

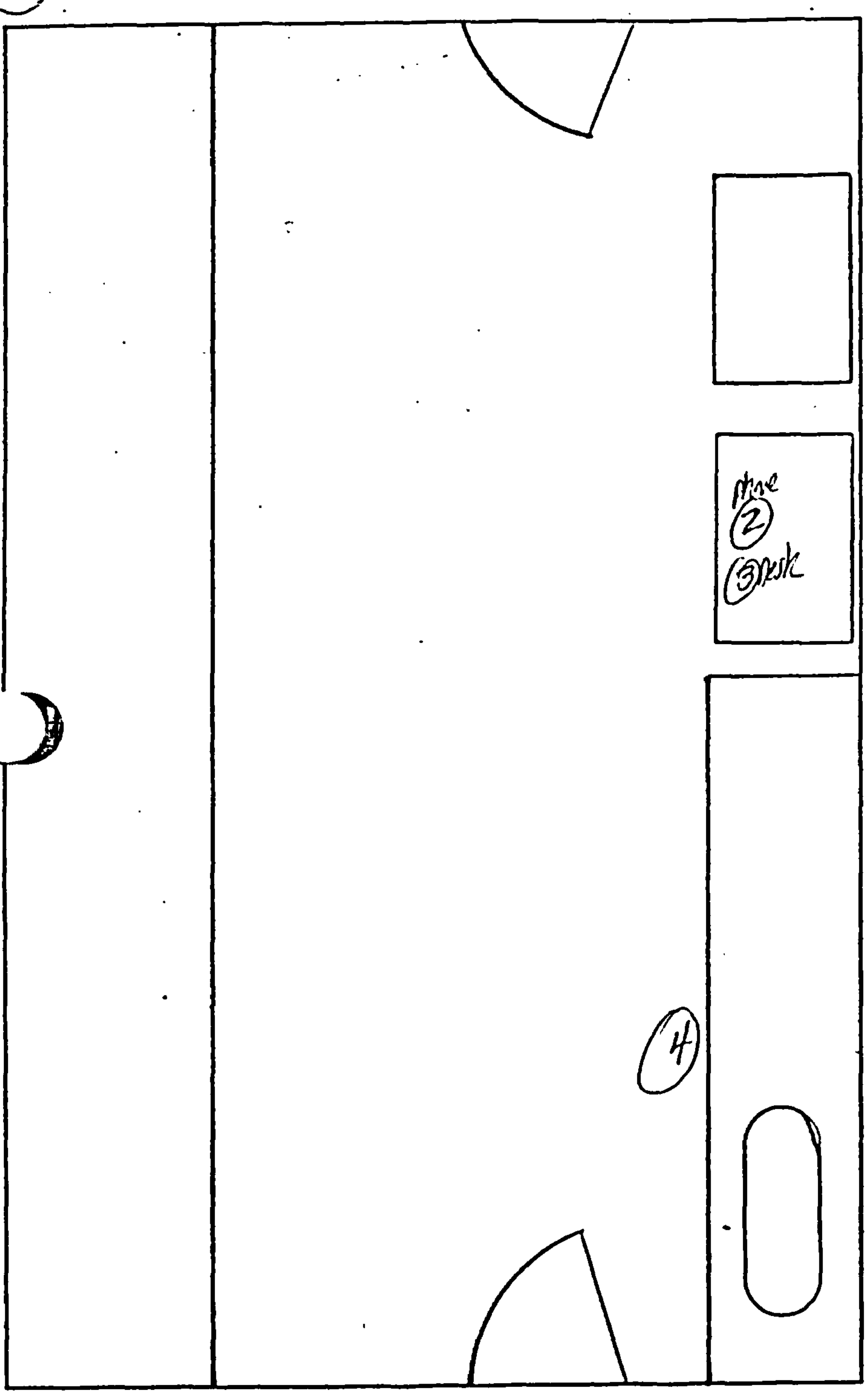
LOG NO. 96-221/4

232

RADIATION AREA SURVEY

DATE 10/3/96

LOCATION MAIN BLDG ROOM 232B



SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
2	14	LLD95	Ø net
3	22	"	Ø net
4	29	100	1.7

$$LLD_{95}=\left\{\left(\frac{\sqrt{50}}{2}\right) \times 2.96\right\} + 25 = 36\ CPM$$

BACKGROUND (#1) 25 CPM

STANDARD (NEN 84000 ...) 85,563

INSTRUMENT Packard 2200

SERIAL NO. 036155

COMMENTS:

RADIATION SPCL.

DATE 10/3/96

U.S EPA
ENVIRONMENTAL RESEARCH LABORATORY -CORVALLIS

Log No. 92-21
1/2

RADIATION CONTAMINATION SURVEY

Date: 11-4-92 Type of Survey: Removable Contamination

Isotope(s): β

Gross Background Counts: 43 ± CPM Total Count Time (min.): 1

Lower Limits of Detection: $\sqrt{43}/1 \times 2.96 = (19.4)$ = cpm

Instrument Used: ☑ GFPC ☐ LSC ☐ Ion Chamber ☐ GM ☐ Scintillation Model: EMC 7358/83810 S/N:

Background: CPM±SD DPM±SD Standard (^{14}C 0.168 μCi 149605 dpm / 372960 40% eff % Error

Swipe No.	Room No.	Swipe Description	Nuclide: per 100 cm² CPM±SD	Net DPM	Net Activity	Nuclide: per 100 cm² CPM±SD	Net DPM	Net Activity
1	130	130 Door	3	LLD25	Ø net			
		N Counter	0	↓	↓			
		Desk	11					
		S. Counter	0					
5		Hood	0					
		Floor ft. Hood	0					
	190	Door	14					
		floor	3					
		floor	0					
		S. Counter	0					
		phone	1					
		desk	7					
	236	Door	6					
		S. Hood	0					
		N. hood	0					
		floor & N. Hood	0					
	232	instrument & floor, Room	2					
		floor	0					
		desk	1					
		phone	3	↓	↓			

Comments:

Radiation Safety 11-6-92 Date

(9/90)

U.S EPA
ENVIRONMENTAL RESEARCH LABORATORY -CORVALLIS

Log No. 92-13

RADIATION CONTAMINATION SURVEY

Date: 6-5-92 Type of Survey: Removable Contamination

Isotope(s): ^{14}C ^{51}Cr ^{3}H

Gross Background Counts: 76 ± CPM Total Count Time (min.): 2

Lower Limits of Detection: $(\sqrt{76}/2)3 = 13$ CPM = cpr

Instrument Used: ☐ GFPC ☒ LSC ☐ Ion Chamber ☐ GM ☐ Scintillation Model: Packard 2200CA S/N: 036755

Background: CPM±SD DPM±SD Standard ^{14}C 84000 DPM = 84,280/84000: 100% eff

Swipe No.	Room No.	Swipe Description	Nuclide: per 100 cm² CPM±SD net	Net DPM	Net Activity	Nuclide: per 100 cm² CPM±SD	Net DPM	Net Acti
2	130	Hood Sash	Ø	Ø	Ø			
		Sill	Ø					
		Floor (Hood)	Ø					
5		Floor (center)	Ø					
		N Counter	Ø					
		desk	Ø					
		phone	Ø					
-		door	Ø					
10	236	~~B~~ S. Hood Sill	Ø					
		Floor (S)	Ø					
		Floor (S)	Ø					
		N. Hood sill	Ø					
		Floor	Ø					
15	INSIDE 236	Floor	Ø					
	232	Desk	Ø					
		Phone	Ø					
	236	door	Ø		↓			
20	256	LSC	Ø	↓	↓			
		Door	Ø					

Comments:

Rick A. Moore 6/17/92
Radiation Safety Date

(9/20)

U.S. Environmental Protection Agency
Western Ecology Division

NRC Radioactive Materials License No. 36-12343-02 Termination and Facility Decommissioning

Date: **November 27, 2004**
Subject: **Room Survey: Main Building 236 Final Contamination Survey.**

Description and Historic Use:

Double lab (450 ft^2). Hydrogen-3 and carbon-14 tracers, and nickel-63 sealed sources. This room was decommissioned as an unrestricted area on April 22, 1999. No isotope use since1999. There is no record of leakage of any sealed sources used in this area.

Surveys:

Total (fixed + removable) and removable contamination surveys were conducted in MB 236 at the time of restricted use decommissioning. The decommissioning records are enclosed. All points surveyed demonstrated no significant contamination. This area meets the contamination criteria for unrestricted use based upon the isotopes used at our facilities.

Records for this room clearly demonstrate that contamination surveys were regularly performed, the area was not subject to any significant contamination events, and the room was maintained as a contaminate-free area. We determined it was unnecessary to conduct further contamination surveys in this area given these survey results and the Western Ecology Division's historic management of radioactive material use in this area. Records of the most recent historic surveys (i.e. prior to the final decommissioning surveys) of MB 236 are included in this report.

The survey for total contamination was conducted using a Ludlum Model 2000 Scaler equipped with a Ludlum Model 44-9, 12-cm^2 thin-window Geiger-Muller pancake detector. Removable contamination was determined using methanol-wetted swipes counted in a Packard 2200 CA dual channel Liquid Scintillation Counter.

DYNAMAC
CORPORATION
Environmental Services

200 SW 35th Street
Corvallis, OR 97333

Telephone: (541) 754-4844
Fax: (541) 754-4818

OK Gile 4/22/99

MEMO

To: Jay Gile, NHEERL RSO
From: Phil Monaco, Dynamac
Date: April 22, 1999

Subject: Decommissioning Survey of MB 236

The Main Building lab room 236 was surveyed for fixed and removable radioactive contamination. Ninety-two 20cm spots were surveyed for fixed contamination. Only two spots surveyed revealed fixed contamination. Both these spots are located in the northeast hood and measured 360 and 600 Bq/100 cm^2.

Eighty-one wet swipes were taken for removable contamination and analyzed for tritium and ^{14}C. Nine swipes demonstrated activity above the detection limits for either tritium or ^{14}C. Of these nine swipes, four demonstrated contamination by tritium above the action level (>1.6 Bq/100 cm^2): three in the northeast hood (and one on the dark room floor). However, only one on the swipes was greater than 5 cpm above the lower limits of detection --a hood swipe (12.9 Bq/100 cm^2). No removable ^{14}C contamination was detected above the action level.

Recommendations:

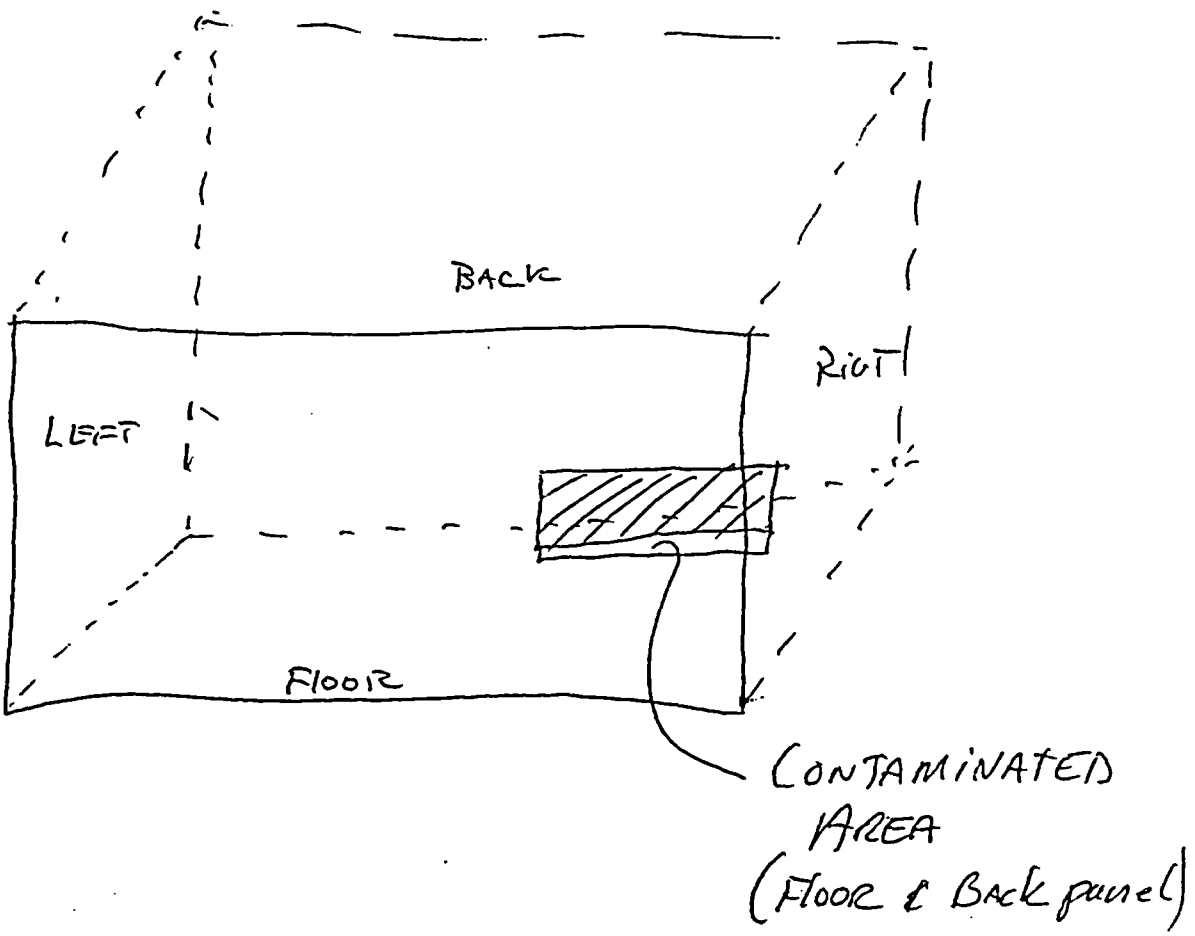
First, I recommend that, even though the contamination is extremely low if not a phantom, the floor area in the dark room be cleaned and further swiped.

Second, given the semi-porous nature of the material the northeast hood is constructed from, cleaning will not be efficient in removing contamination. Therefore, it should go on record that an area of the hood (see attached) is permanently contaminated and should be posted and treated as such during future maintenance operations.

Records of these surveys were logged as 99-9, 99-10, and 99-11, and placed on file in MB 190.

If you have any questions, please contact me.

Attachment (1)


BACK
RIGHT
LEFT
FLOOR
CONTAMINATED
AREA
(FLOOR & BACK panel)

Protocol #:28 N( ):14C.RadSafety 22-Apr-99 11:43
Region A: LL-UL= 0.0-156. Lcr= 0 Bkg= 0.00 %2 Sigma=1.00
Region B: LL-UL= 4.0-156. Lcr= 0 Bkg= 0.00 %2 Sigma=1.00
Region C: LL-UL= 0.0- 0.0 Lcr= 0 Bkg= 0.00 %2 Sigma=0.00
Time = 5.00 QIP = tSIE ES Terminator = Count
14C.QuenchCurve
Conventional DPM
Nuclide 1 = 113700
Luminescence Correction On

14C

S#	TIME	CPMA	DPM1	A:2S%	CPMB	B:2S%	SIS	tSIE	FLAG	LUM	
1	5.00	18.00	18.83	22.66	16.20	22.22	120.71	977.		12	BLANK
2	1.24	50906.5	53111.9	0.79	32417.7	0.99	19.500	895.		0	
3	0.52	80163.5	83922.9	0.98	78057.7	0.99	166.42	1004		0	14C 84000K
(9 missing vials)											
13	5.00	19.40	23.12	26.32	16.80	21.82	88.190	197.		25	BKGRD
14	5.00	20.80	25.16	23.39	16.00	22.36	83.270	185.		15	#1
15	5.00	20.60	24.75	22.89	17.20	21.56	76.490	190.		15	#2
(15 missing vials)											
31	5.00	434.20	458.53	4.31	380.20	4.58	93.350	609.		0	
32	5.00	1594.20	1693.04	2.24	1207.20	2.57	68.270	584.		0	
33	5.00	7934.00	8411.01	1.01	4584.40	1.32	27.210	592.		1	
34	5.00	124.60	133.97	8.11	117.80	8.24	103.12	537.		1	
35	5.00	1096.60	1162.84	2.70	1048.60	2.76	109.60	591.		0	
36	4.38	9505.02	10110.2	0.98	9139.50	0.99	110.21	578.		0	
37	0.49	86036.7	91516.3	0.97	82836.7	0.99	109.87	578.		0	

$$LLD_{95} = \left(\frac{\sqrt{100}}{5}\right) 2.96 + .20 = 25 \text{ cpm}$$

Swipe #1 ~~20~~ 20.8 cpm < LLD_{95} Activity NOT DETERMINED

Swipe #2 20.6 < LLD_{95} NOT DETERMINED

Lab 236 Dark Room Reswipe of Floor Area

Ok

P.A. Monaco

Protocol #:27 N( ):3H.RadSafety 22 1-Apr-99 12:45
Region A: LL-UL= 0.0-18.6 Lcr= 0 Bkg= 0.00 %2 Sigma=1.00
Region B: LL-UL= 2.0-18.6 Lcr= 0 Bkg= 0.00 %2 Sigma=1.00
Region C: LL-UL= 0.0- 0.0 Lcr= 0 Bkg= 0.00 %2 Sigma=0.00
Time = 2.00 QIP = tSIE ES Terminator = Count
Tritium , Std. curve generated by mean of 3 cts
Conventional DPM
Nuclide 1 = 139236
Luminescence Correction On

3H

S#	TIME	CPMA	DPM1	A:2S%	CPMB	B:2S%	SIS	tSIE	FLAG	LUM	
1	2.00	11.50	18.94	51.44	10.50	49.48	21.630	968.		4	BLANK
2	0.79	50887.3	87489.5	1.00	45898.7	1.05	19.230	893.		0	3H 85000K
3	2.00	16563.0	26803.8	1.10	16060.0	1.11	33.160	1000	E	0	
(9 missing vials)											
13	2.00	8.00	42.87	66.14	8.00	53.03	30.490	196.		26	BKGRD
14	2.00	9.50	54.49	58.60	9.50	50.48	26.100	185.		41	#1
15	2.00	12.00	66.62	50.00	10.00	46.90	24.670	190.		15	#2
(15 missing vials)											
31	2.00	173.00	348.81	10.96	159.50	11.30	25.380	607.		1	
32	2.00	976.50	2012.65	4.56	883.50	4.76	20.530	583.		1	
33	2.00	7300.00	14966.7	1.66	6387.50	1.77	16.540	589.		1	
34	2.00	53.50	116.14	20.39	49.50	20.50	32.980	534.		2	
35	2.00	334.50	684.51	7.82	328.50	7.83	33.660	591.		1	
36	2.00	2996.00	6200.52	2.59	2915.00	2.62	33.350	579.		0	
37	1.53	26224.2	54056.5	1.00	25505.9	1.01	33.240	583.		0	

$LLD_{95} = \left(\frac{\sqrt{16}}{2}\right) 2.96 + 8 = 14 \text{ CPM}$

			Activity
Swipe # 1	9.5 CPM	< LLD_{95}	NOT DETERMINED
Swipe # 2	12.0	< LLD_{95}	NOT DETERMINED

LAB 236 DARK ROOM Reswipes of Floor AREA

OK

D.A. Monaco

NHEERL-WED

RADIATION AREA SURVEY

REMOVABLE CONTAMINATION

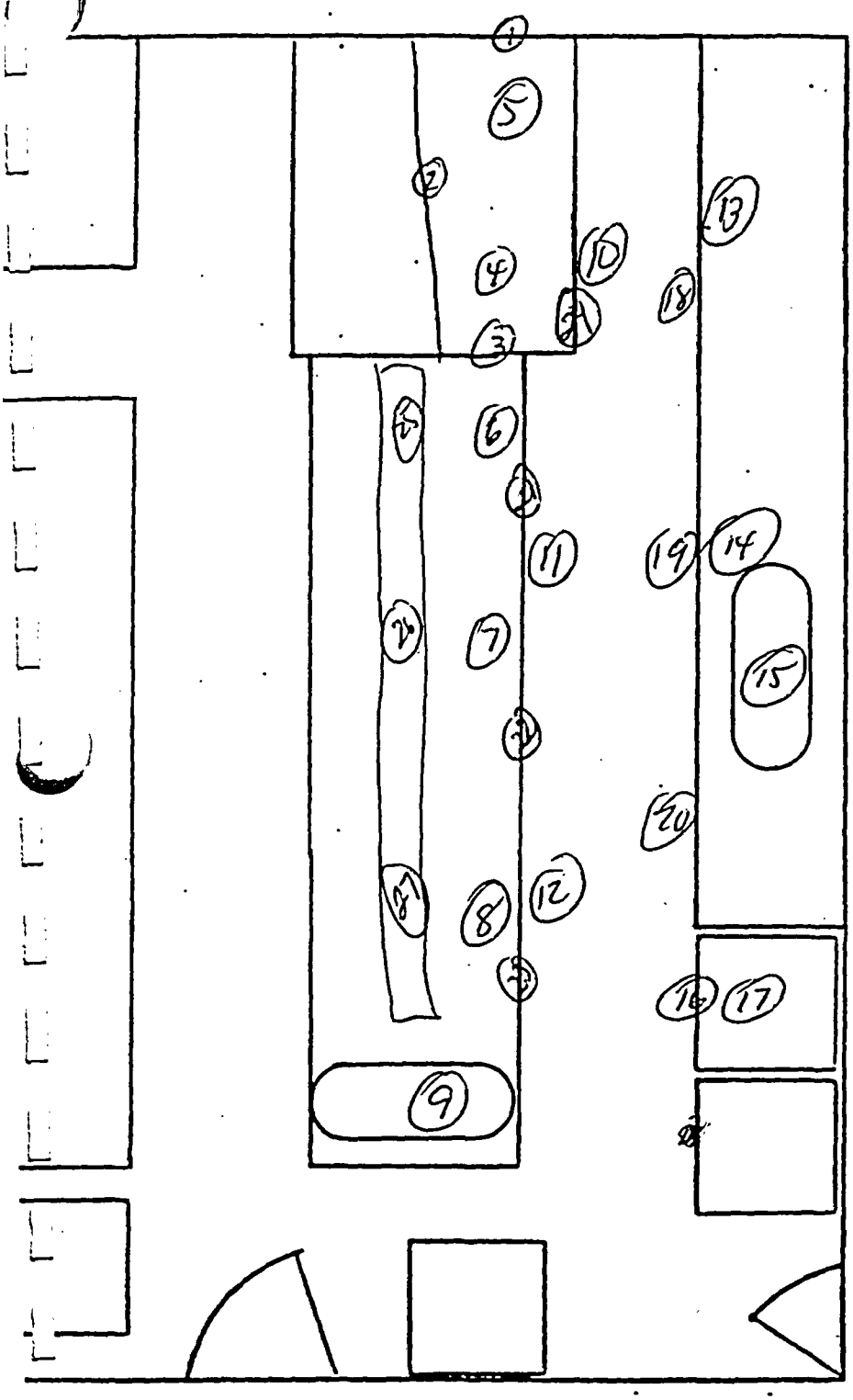
LOG NO. 99-10

1/3

DATE 4-20-99

LOCATION MAIN BLDG ROOM 236

3H



SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
1	8.5	< LLD₃₅	ND*
2	12		
3	11		
4	14		
5	9		
6	17		
7	13		
8	14		
9	17		
10	14		
11	16		
12	12		
13	14		
14	10		
15	10		
16	15		
17	13		
18	19		
19	16		
20	21		
21	11		
22	17		
23	9		
24	11		
25	10		
26	15		
27	16		
	~~22~~		

cab Floor TS

SILL

$LLD_{95} = \left\{\left(\frac{\sqrt{2B}}{2}\right) \times 2.96\right\} + B = 22$ CPM

BACKGROUND 14 CPM

STANDARD (3H 85,543 dpm) 85,543 dpm VV

INSTRUMENT PACKARD 2200CA

SERIAL NO. 036755

N

COMMENTS: ND* = NOT DETERMINED. < LLD = LOWER LIMITS OF DETECTION.

** Action Level 1.7 Bq/100 cm².

RADIATION SPCL.

4-22-99

DATE

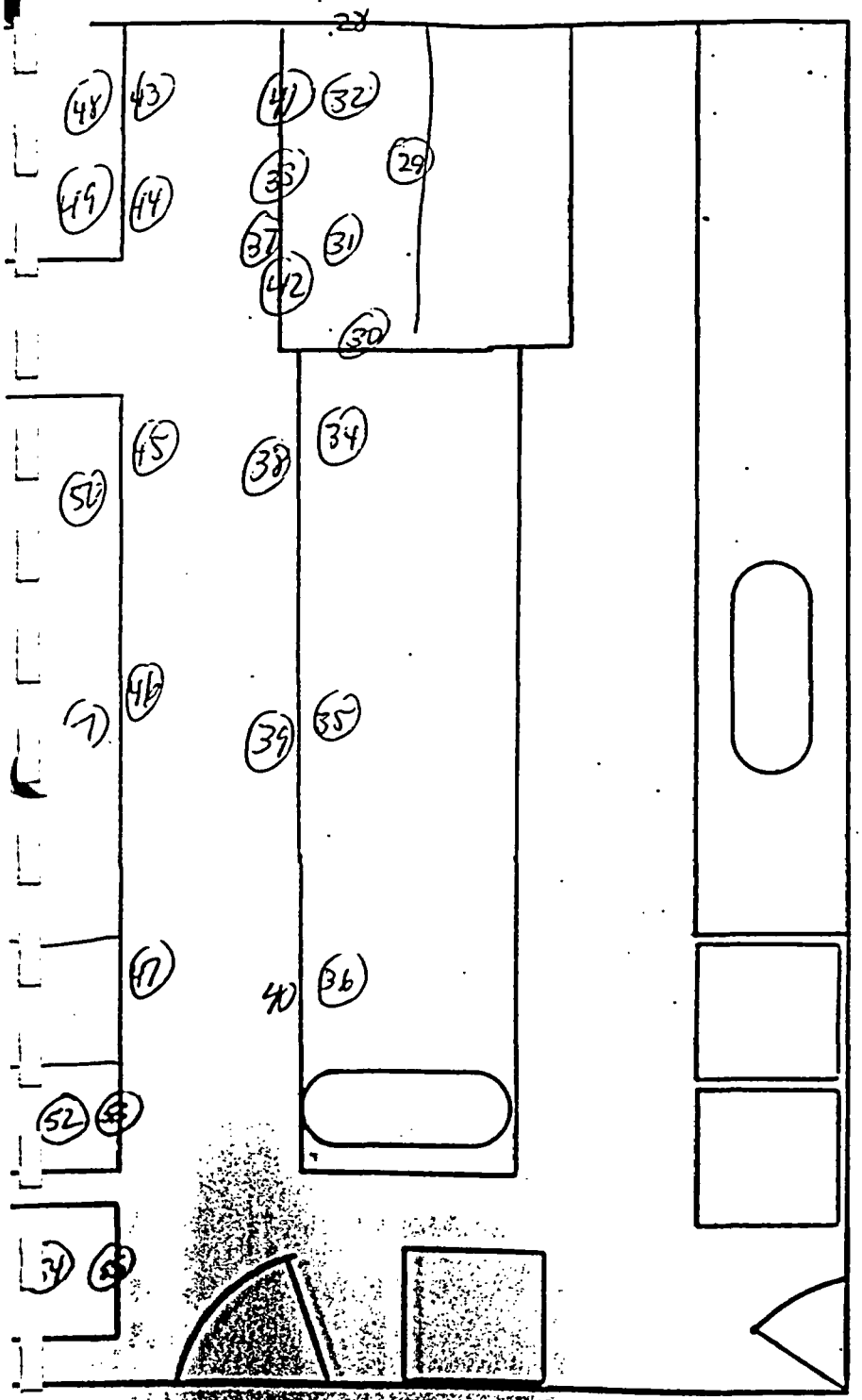
NHEERL-WED

RADIATION AREA SURVEY

2/3

DATE 4-20-99

LOCATION MAIN BLDG ROOM 236



SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²	
28	14	<LLD₉₅	ND*	
29	24	224	3.7	HOOD SWIPES
30	24	224	3.7	
31	15	<LLD₉₅	ND*	
32	57	772	12.9	
33	21	<LLD₉₅	ND*	SILL
34	15			
35	14			
36	13			
37	11			
38	16			
39	11			
40	13			
41	19			cab Front
42	17			
43	17			
44	14			
45	18			
46	16			
47	14			
48	13			
49	13			
50	13			
57	11			
52	14			
53	16			
54	14			
55	11			

$LLD_{95} = \{(\sqrt{\quad}) \times 2.96\}^2 = \quad CPM$

BACKGROUND _____

STANDARD (_____)

INSTRUMENT _____

SERIAL NO. _____

COMMENTS:

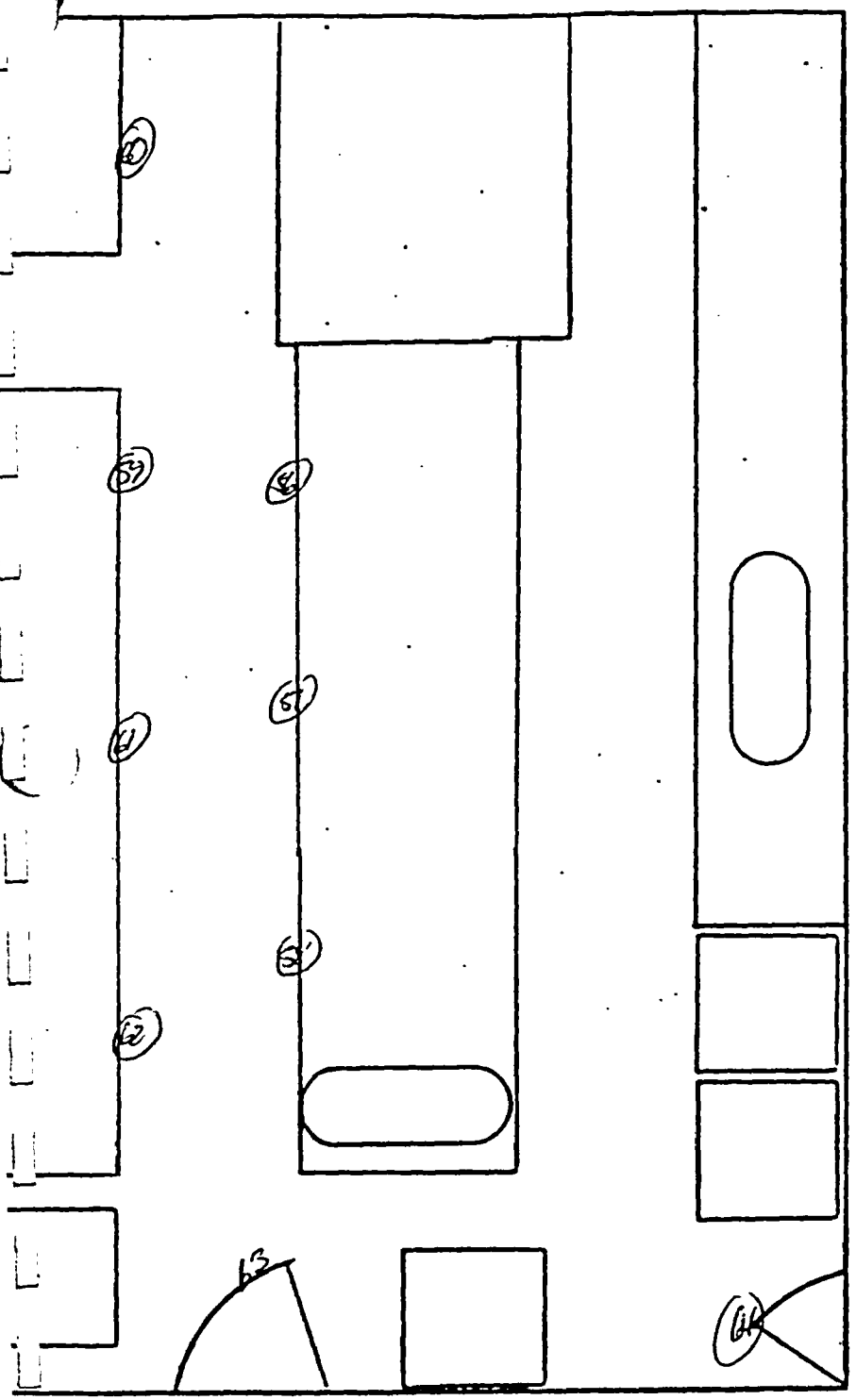
RADIATION SAFETY OFFICER _____ DATE _____

NHEERL-WED

RADIATION AREA SURVEY

DATE 4-20-99

LOCATION MAIN BLDG ROOM 236



SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
56	14	LLD_{95}	ND*
57	14		
58	12		
59	16		
60	16		
61	13		
62	12		
63	22		
64	14		
65	16		
66	19		
67	21		
68	15		
69	12		
70	12		
71	12		
72	24	224	3.7
73	18	LLD_{95}	ND*
74	13		
75	16		
76	9		
77	15		
78	17		
79	12		
80	9		
81	14		

ON Back

$LLD_{95} = \{(\sqrt{\quad}) \times 2.96\} + \quad = \quad$ CPM

BACKGROUND _____

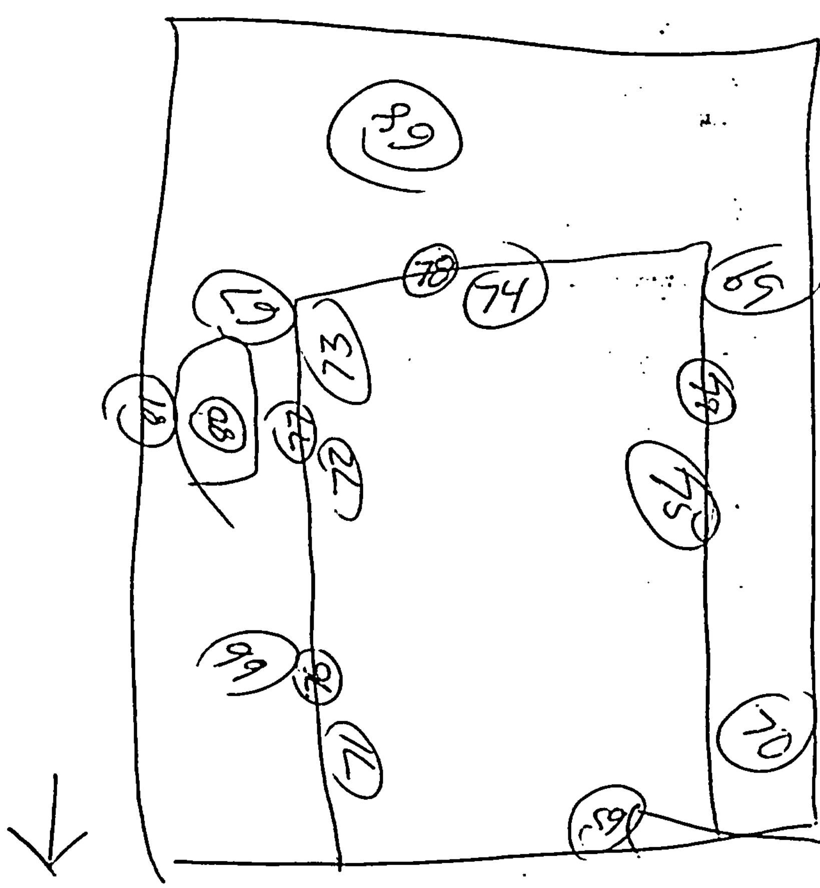
STANDARD ( ) _____

INSTRUMENT _____

SERIAL NO. _____

COMMENTS:

RADIATION SPCL: _____ DATE _____



NHEERL-WED

LOG NO. 99-11

1/3

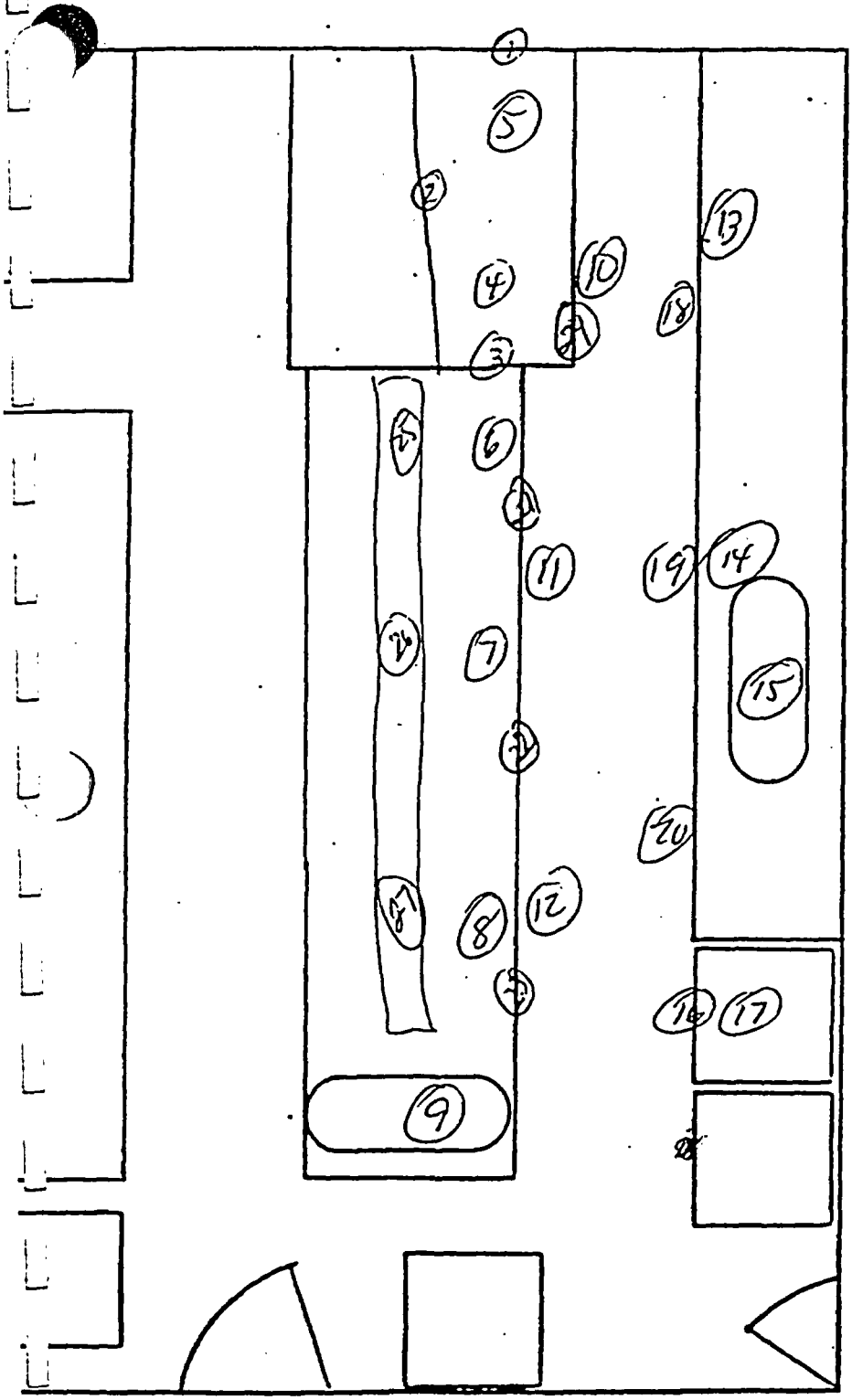
RADIATION AREA SURVEY

REMOVABLE CONTAMINATION

DATE 4-20-99

LOCATION MAIN BLDG ROOM 236

14C



SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
1	23	<LLD95	ND*
2	18		
3	18		
4	23		
5	20		
6	20		
7	22		
8	22		
9	22		
10	22		
11	24		
12	22		
13	24		
14	17		
15	24		
16	21		
17	23		
18	24		
19	19		
20	24		
21	21		lab Fizn TS
22	19		
23	24		SILL
24	21		
25	25		
26	23		
27	18		

$LLD_{95} = \left\{ \left(\frac{\sqrt{102}}{5} \right) \times 2.96 \right\} + 26$ CPM

BACKGROUND 20.4 CPM (27 dpm)

STANDARD (¹⁴C 84,000 dpm) 83,085 dpm

INSTRUMENT PACKARD 2200 CA

SERIAL NO. 036755

COMMENTS: See PAGE 2

RADIATION SPCL.

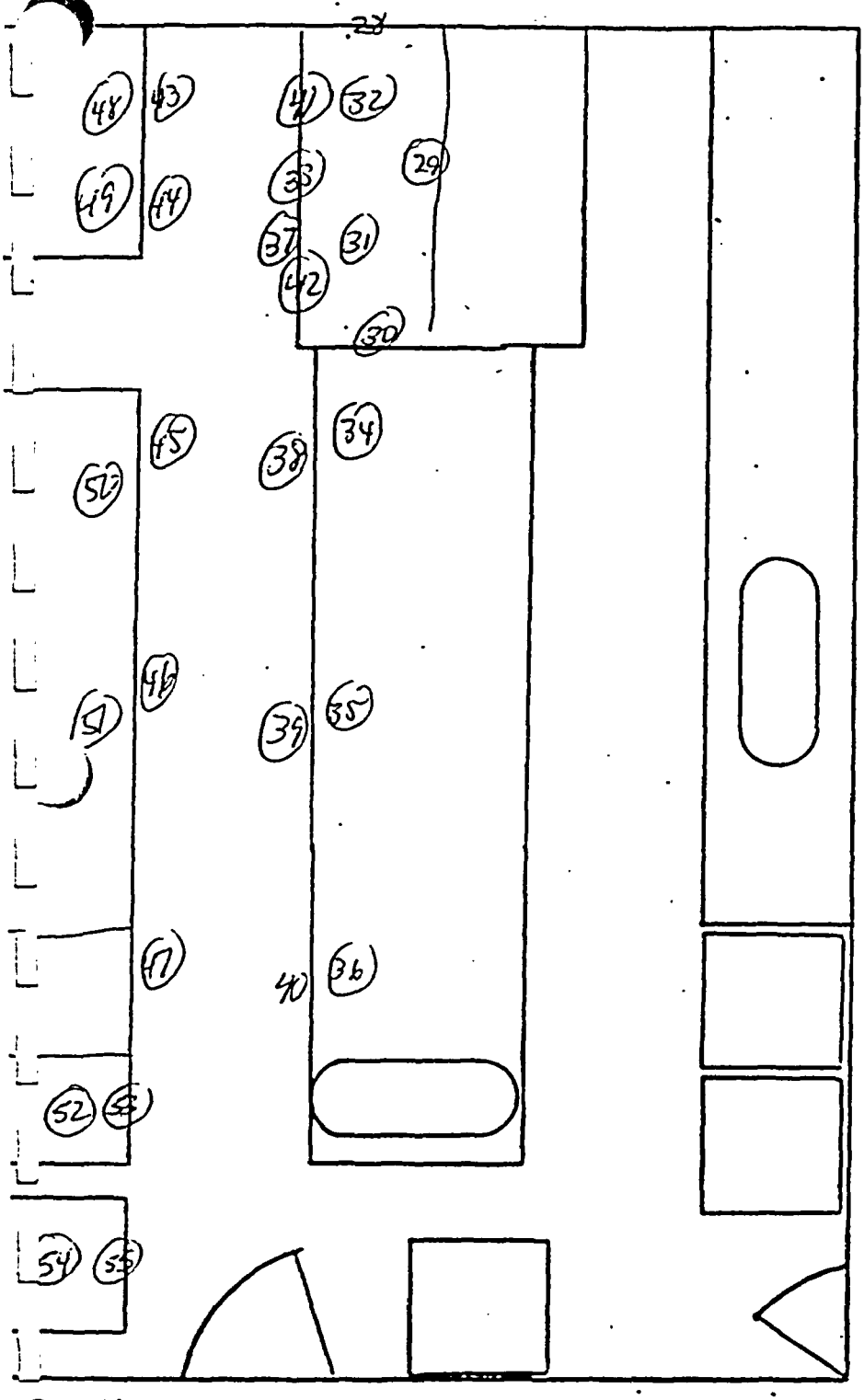
4-27-99
DATE

RADIATION AREA SURVEY

LOG NO. _____ 2/3

DATE 4-20-99

LOCATION MAIN BLDG ROOM 236



SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²	
28	19	LLD95	ND*	
29	36	22	0.37	
30	28	11	0.18	
31	24	LLD95	ND*	
32	69	69	1.2	
33	22	LLD95	ND*	SILL
34	27	10	0.16	
35	27	10	0.16	
36	23	LLD95	ND*	
37	23			
38	23			
39	20			
40	19			
41	23			cab front
42	22			
43	19			
44	18			
45	19			
46	21			
47	19			
48	24			
49	23			
50	24			
51	22			
52	20			
53	22			
54	21			
55	23			

$LLD_{95} = \{(\sqrt{\quad}) \times 2.96\} + \quad = \quad CPM$

BACKGROUND _____

STANDARD ( ) _____

INSTRUMENT _____

SERIAL NO. _____

*ND = NOT DETERMINED, 2 Lower Limits of DETECTION.

COMMENTS: **Action Level is 1.7 Bq/100 cm².

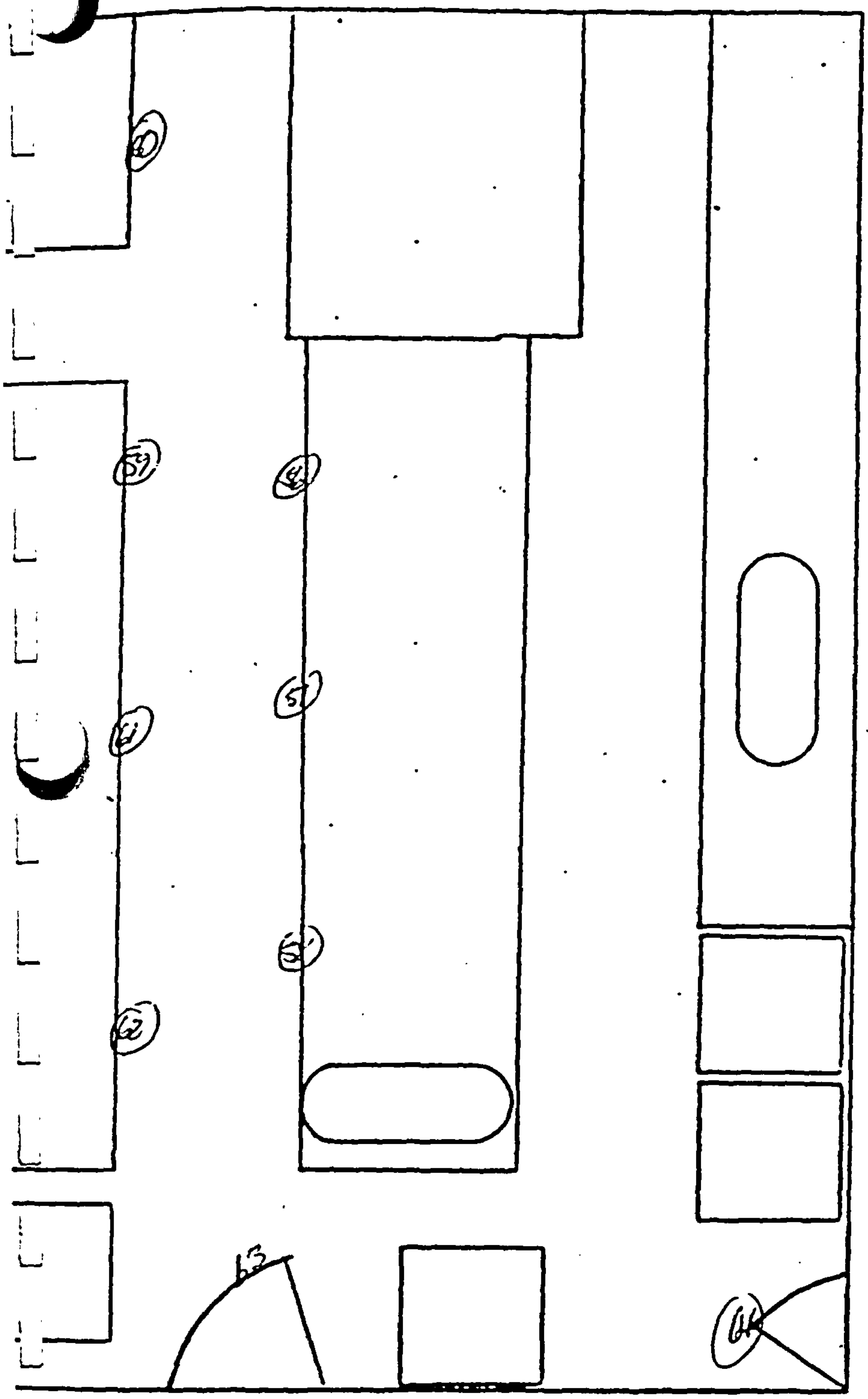
Phil A Mon
RADIATION SPCL.

4-22-99
DATE

RADIATION AREA SURVEY

3/3

DATE 4-20-99 LOCATION MAIN BLDG ROOM 236



SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM^2
56	21	<LLD95	ND*
57	22		
58	24		
59	24		
60	21		
61	22		
62	20		
63	25		
64	21		
65	21		
66	21		
67	21		
68	21		
69	19		
70	23		
71	23		
72	23		
73	21		
74	25		
75	19		
76	22		
77	21		
78	21		
79	23		
80	18		
81	21		

ON Back

$LLD_{95} = \{(\sqrt{\quad}) \times 2.96\} + = $ CPM

BACKGROUND

STANDARD ( )

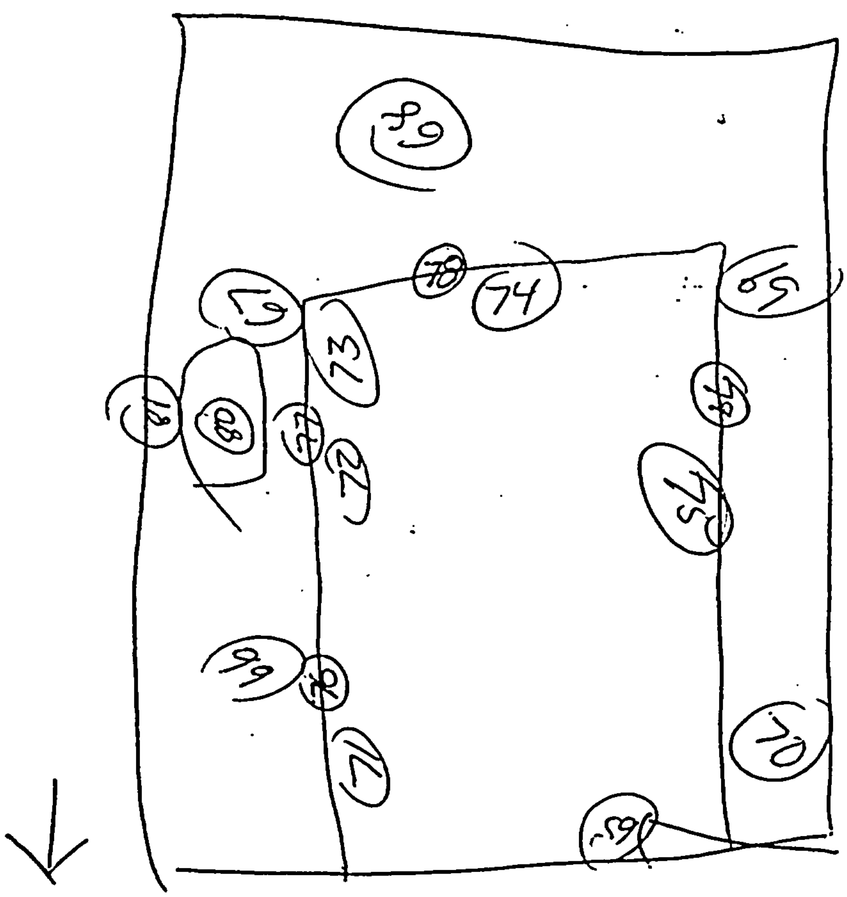
INSTRUMENT

SERIAL NO.

E – N

COMMENTS:

RADIATION SPCL. DATE



78
74
73

NHEERL-WED

RADIATION AREA SURVEY

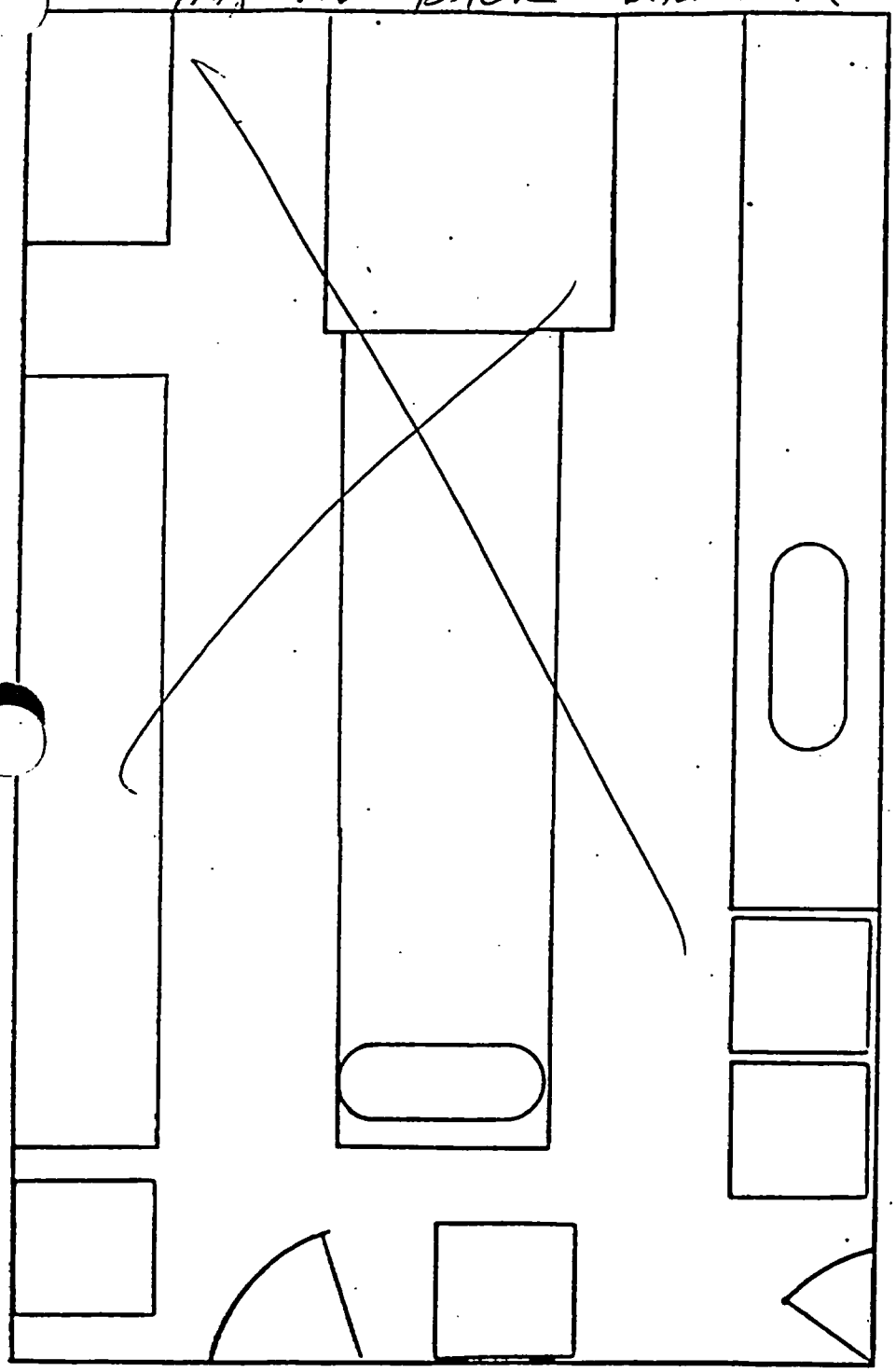
FIXED CONTAMINATION

LOG NO. 99-9 1/4

DATE 4-15-99

LOCATION MAIN BLDG ROOM 236

MAP OF BACK DARK ROOM



SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
1	80	LLD95	ND*
2	66		
3	54		
4	52		
5	72		
6	66		
7	48		
8	54		
9	54		
10	32		
11	38		
12	38		
13	70		
14	62		

$LLD_{95} = \left\{\left(\frac{\sqrt{21}}{0.5}\right) \times 2.96\right\} + \text{x2} = .96$ CPM

BACKGROUND 42 CPM

STANDARD (0.168 nC) 12743 cpm

INSTRUMENT Ludlum 2000

SERIAL NO. 83810

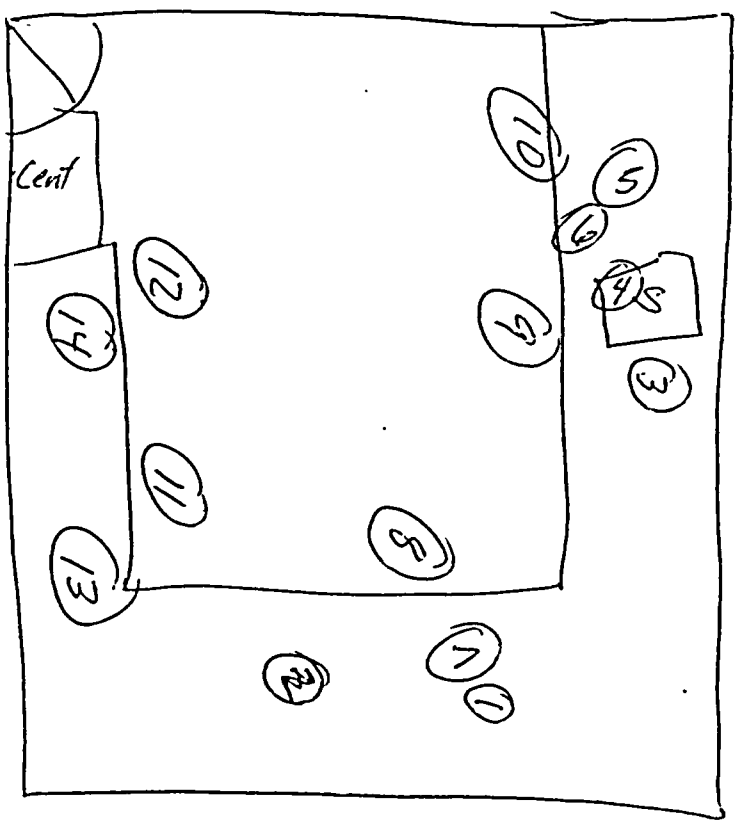
* 3.4% Eff.

COMMENTS: * ND = NOT Determined. L Lower Limits of Detection.

RADIATION SPCL.

4-20-99
DATE

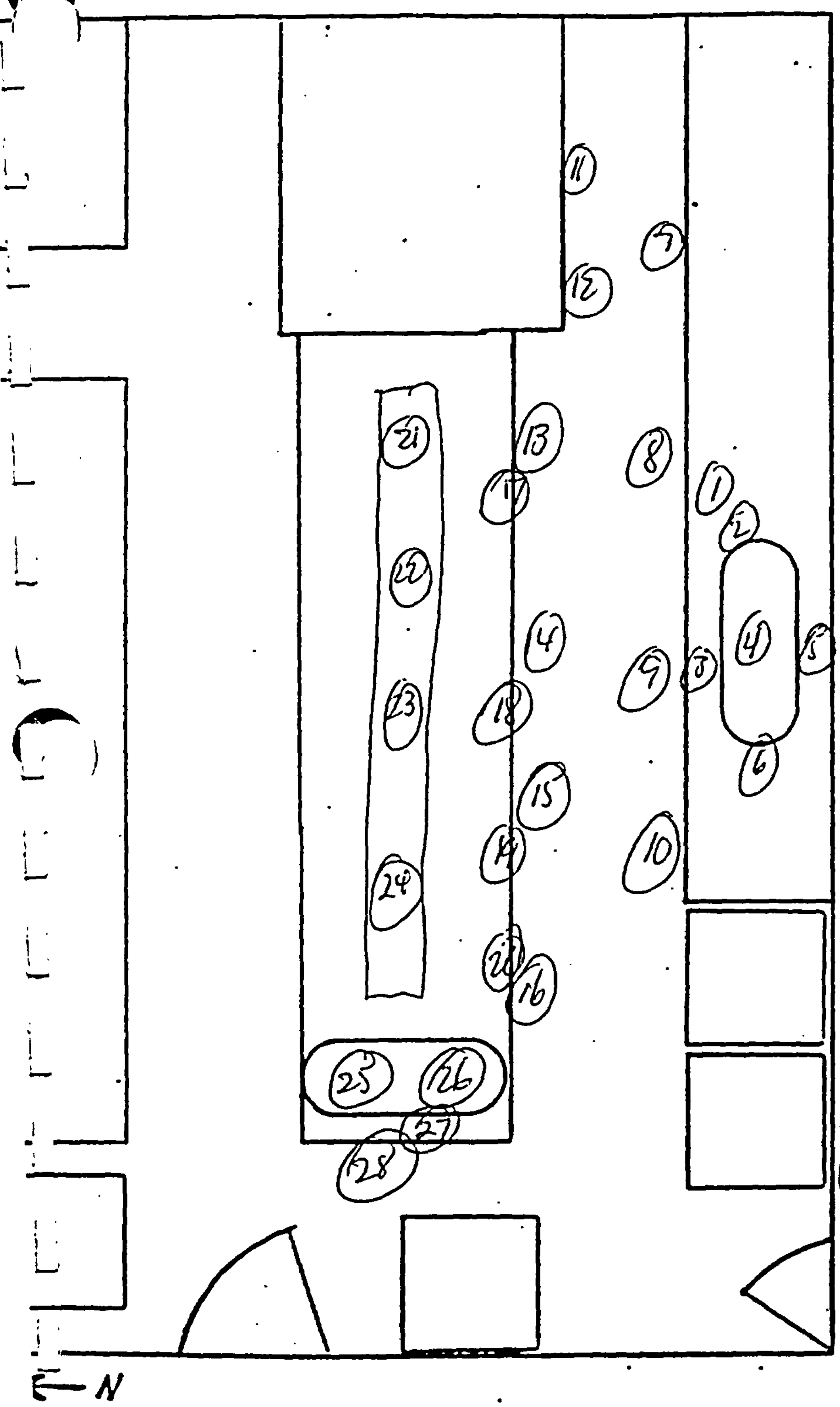
DARK ROOM
236



NHEERL-WED
RADIATION AREA SURVEY

DATE 4-14-99 LOCATION MAIN BLDG ROOM 236

t=0.5'



SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
1	58	<LLD95	ND
2	50	↓	↓
3	48	↓	↓
4	48	↓	↓
5	52	↓	↓
6	48	↓	↓
7	40	↓	↓
8	54	↓	↓
9	42	↓	↓
10	52	↓	↓
11	60	↓	↓
12	60	↓	↓
13	36	↓	↓
14	42	↓	↓
15	30	↓	↓
16	48	↓	↓
17	50	↓	↓
18	48	↓	↓
19	38	↓	↓
20	48	↓	↓
21	48	↓	↓
22	52	↓	↓
23	48	↓	↓
24	38	↓	↓
25	48	↓	↓
26	48	↓	↓
27	46	↓	↓
28	52	↓	↓

(Swipes 17–19: Cabinet face)

$2\left(LLD_{95} = \left\{\left(\sqrt{2 \cdot 48/0.5}\right) \times 2.96\right\}\right) = 53 \times 2 = 106$ CPM

BACKGROUND 48 CPM

STANDARD (¹⁴C 0.168 µCi) 12,646 CPM *

INSTRUMENT Ludlum 2000

SERIAL NO. 83810

3.4% eff.

COMMENTS: * ND = NOT Determined < Lower Limit of Detection @

B.A. M[illegible] 4-20-99

RADIATION SPCL. DATE

NHEERL-WED

RADIATION AREA SURVE

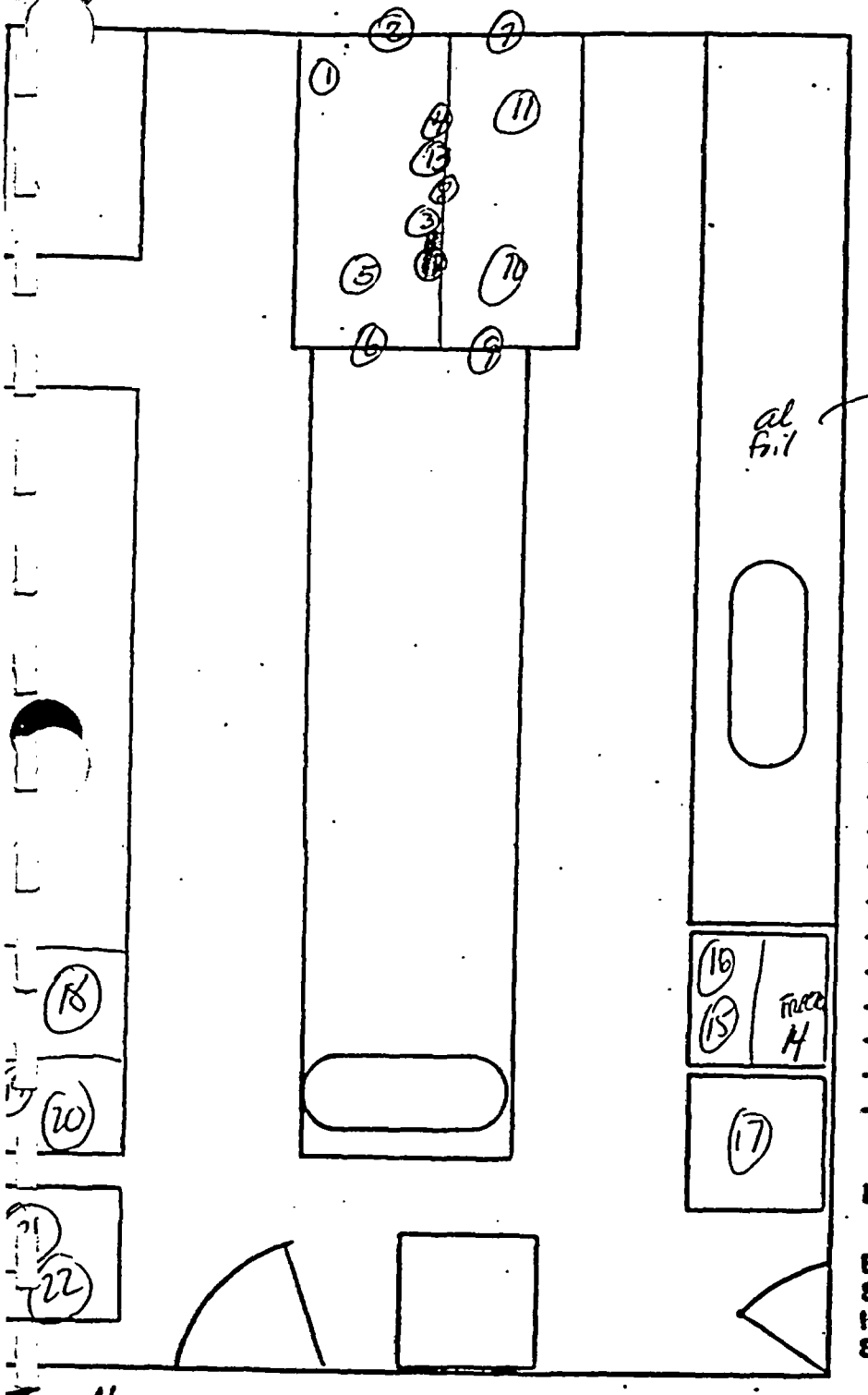
Fixed

LOG NO. 99-

3/4

DATE 4-19-99

LOCATION MAIN BLDG ROOM 236



SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²	
1	28	<LLD	ND*	
2	40	↓	↓	Side
3	292	7235dpm	120 Bq ×5=	600 Bq
4	58	<LLD	ND	
5	32			
6	36			Side
7	38			Side
8	40			S Back
9	32			side
10	34			
11	26	↓	↓	
12	92	4294dpm	72 Bq	N Back 360 Bq
13	34	<LLD	ND	
14	38	↓	↓	
15	36			
16	40			
17	30			
18	28			
19	48			
20	50			
21	46			
22	52	↓	↓	

$LLD_{95} = \left\{\left(\frac{\sqrt{23}}{0.3}\right) \times 2.96\right\} \div \text{CPM}$ ×2 = 103 CPM

BACKGROUND 46 CPM

STANDARD (¹⁴C 0.68) 12658 CPM

INSTRUMENT Ludlum 2000

SERIAL NO. 83810

COMMENTS: * ND = Not Determined. < Lower Limit of Detection

Conversion to 100 cm² = ×5

RADIATION SPCL.

4-20-99
DATE

LOG NO. 99 — [illegible]

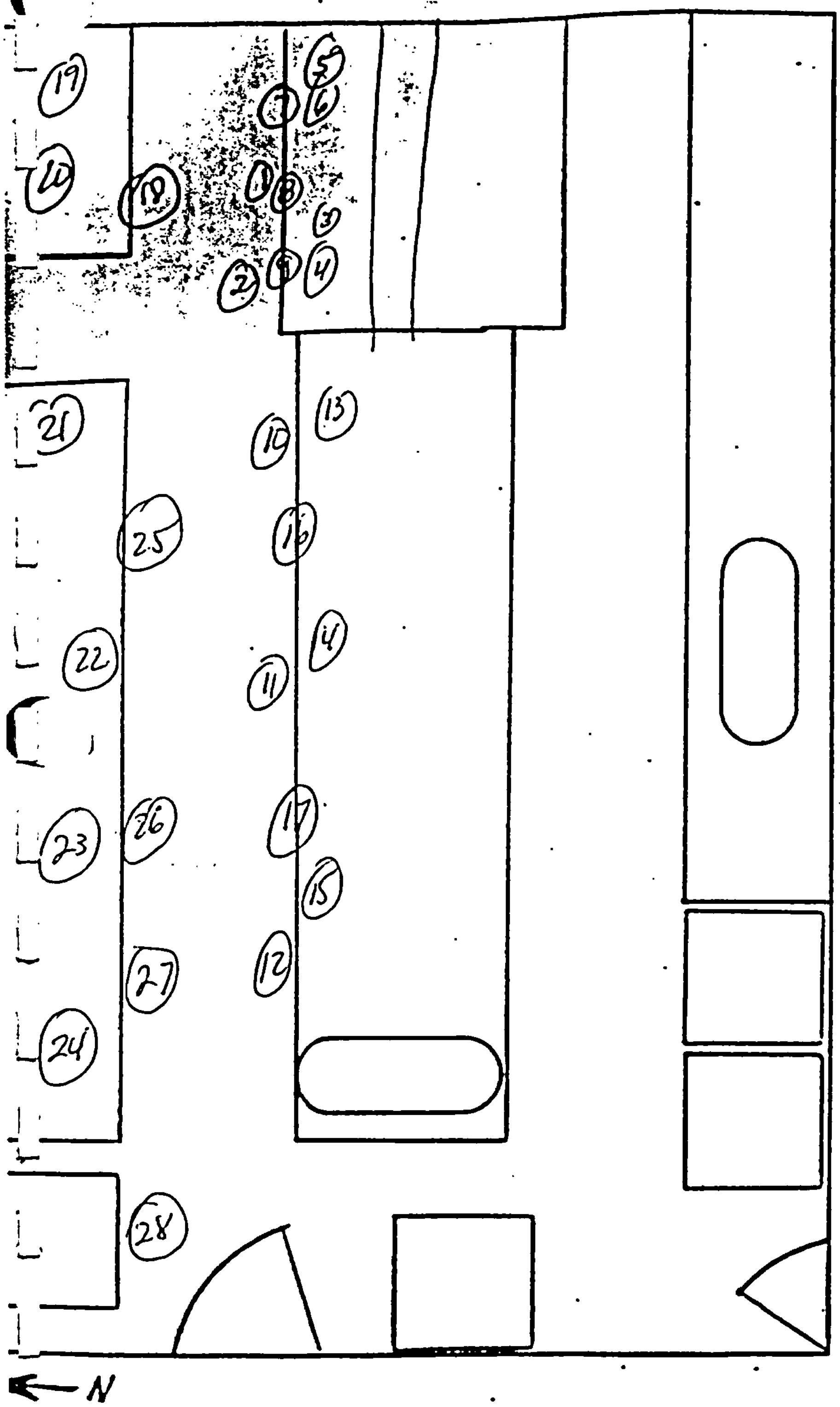
NHEERL-WED
RADIATION AREA SURVEY

Fixed

4/4

DATE 4-19-99

LOCATION MAIN BLDG ROOM 236



SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM^2	
1	52	<LLD95	ND*	
2	58	↓	↓	
3	58			inside cabinet
4	48			
5	62			
6	58			
7	48			
8	58			cabinet face
9	64			
10	50			
11	48			
12	52			
13	56			
14	50			
15	66			
16	40			cabinet face
17	50			
18	52			
19	64			
20	64			
21	66			
22	54			
23	48			
24	68			
25	64			
26	54			
27	48			
28	50	↓	↓	

$$LLD_{95}=\left\{\left(\frac{\sqrt{23}}{0.5}\right)\times 2.96\right\}+ \text{ } = \text{ CPM}$$

*2 = 103

BACKGROUND 46 cpm

STANDARD (^{14}C 0.168 μCi) 12,698 cpm

INSTRUMENT Ludlum 2000

SERIAL NO. 83810

COMMENTS: ND* = NOT DETERMINED. < Lower Limits OF DETECTION.

O.A. [signature] — RADIATION SPCL.

4-20-99 — DATE

interoffice
MEMORANDUM

To: Mr Gile
From: Joel McCrady
Date: Apr 12, 1999
Subject: Radiation Safety

A thorough examination of Laboratory 236, Main EPA building, has been conducted. Inclosed are radioactive swipes for your records. There is no radioactive waste, samples, or standards located in Lab 236 (zero micro-curies). Do not hesitate to call on me for additional assistance. Do you require a urine sample or any additional information for your official records? You can expect my full cooperation, as always.

CC: Peter Beedlow
Jillian Gregg

Name: 14C.RadSafety 12-Apr-89 11:04
Region A: LL-UL= 0.0-1 . Lcr= 0 Bkg= 0.00 %2 Sigma=1.00
Region B: LL-UL= 4.0-156. Lcr= 0 Bkg= 0.00 %2 Sigma=1.00
Region C: LL-UL= 0.0- 0.0 Lcr= 0 Bkg= 0.00 %2 Sigma=0.00
Time = 5.00 QIP = tSIE ES Terminator = Count
14C.QuenchCurve
Conventional DPM
Nuclide 1 = 113700
Luminescence Correction On

S#	TIME	CPMA	DPM1	A:2S%	CPMB	B:2S%	SIS	tSIE	FLAG	LUM
STD 1	0.38	108697.	113768.	0.98	105905.	0.99	165.86	997.		0
2	0.38	108826.	113299.	0.98	105384.	0.99	141.86	831.		0
3	0.39	107349.	112195.	0.97	102959.	0.99	115.79	664.		0
4	0.41	105446.	114257.	0.96	99975.6	0.98	89.940	507.		0
5	0.42	103317.	113678.	0.96	96402.4	0.99	71.590	400.		0
6	0.43	102360.	114070.	0.95	93244.2	0.99	57.170	312.		0
7	0.47	98287.2	113172.	0.93	86657.4	0.99	44.200	233.		0
8	0.52	92948.1	112838.	0.91	78163.5	0.99	34.990	181.		0
9	0.55	91350.9	114932.	0.89	72980.0	0.99	29.120	145.		0
10	0.63	86312.7	114263.	0.85	63728.6	0.99	24.350	118.	E	0
Blank 11	5.00	22.00	23.00	20.40	19.00	20.51	93.730	956.		8
STD 12	0.52	80357.7	84090.4	0.97	78115.4	0.99	164.99	991.		0
swipe 13	5.00	30.60	35.78	17.29	27.00	17.21	95.900	216.		5
14	5.00	28.20	32.94	18.22	24.20	18.18	100.87	217.		6
15	5.00	27.00	31.59	18.91	22.40	18.89	91.080	215.		6
16	5.00	22.80	27.00	20.00	18.40	20.85	107.04	203.		5
17	5.00	27.40	32.52	18.63	24.60	18.03	124.83	201.		8
18	5.00	30.80	36.37	17.42	22.60	18.81	89.520	206.		6
19	5.00	28.20	33.25	18.33	23.20	18.56	106.70	207.		7
20	5.00	24.00	28.30	20.13	21.40	19.33	132.14	207.		10
21	5.00	25.80	30.43	18.66	21.40	19.33	114.88	207.		4
22	5.00	27.20	32.17	19.06	21.40	19.33	92.450	204.		11

700 dpm

13 — Blank swipe
14 — Rad Refrigerator - outside
15 — S. Hood, 236, Sill
16 — Sink, 236
17 — Sink, 232
18 — N. Hood, Sill
19 — Floor, Front of S. Hood
20 — Floor, Front of Rad. Refrig.
21 — Blank Swipe
22 — Floor, 232

12 Apr 99

Protocol #:27 N[illegible]:3H.RadSafety
Region A: LL-UL= 0.0-[illegible].6 Lcr= 0 Bkg= 0.00 %2 Sigma=1.00
Region B: LL-UL= 2.0-18.6 Lcr= 0 Bkg= 0.00 %2 Sigma=1.00
Region C: LL-UL= 0.0- 0.0 Lcr= 0 Bkg= 0.00 %2 Sigma=0.00
Time = 5.00 QIP = tSIE ES Terminator = Count
Tritium , Std. curve generated by mean of 3 cts
Conventional DPM
Nuclide 1 = 139236
Luminescence Correction On

S#	TIME	CPMA	DPM1	A:2S%	CPMB	B:2S%	SIS	tSIE	FLAG	LUM
1	0.48	84145.8	137877.	0.99	76941.7	1.04	20.420	978.		0
2	0.52	77571.2	141470.	0.99	68646.2	1.05	17.640	788.		0
3	0.57	70112.3	138998.	1.00	59591.2	1.08	15.260	627.		0
4	0.68	58898.5	139592.	1.00	47061.8	1.11	12.880	468.		0
5	0.81	49544.5	139401.	1.00	36972.8	1.15	11.320	371.		1
6	1.01	39570.3	139516.	1.00	26465.4	1.22	9.950	286.		1
7	1.36	29287.5	139975.	1.00	17036.8	1.31	8.750	216.		1
8	1.84	21665.2	139476.	1.00	10895.1	1.41	7.960	168.		1
9	2.48	16073.4	139915.	1.00	6949.19	1.52	7.380	136.		1
10	3.30	12047.9	140443.	1.01	4465.15	1.64	6.920	112.	E	1
11	5.00	14.60	24.01	26.98	13.80	25.10	21.940	971.		15
12	0.79	50905.1	88246.2	1.00	45876.0	1.05	19.030	879.		0
13	5.00	14.00	69.04	27.70	13.20	25.71	24.900	210.		13
14	5.00	12.00	58.87	30.91	10.80	28.68	26.420	211.		16
15	5.00	15.80	78.75	25.44	14.20	24.71	27.040	208.		11
16	5.00	16.40	86.85	24.14	16.20	23.03	25.710	198.		13
17	5.00	16.40	92.14	25.34	15.20	23.82	27.510	188.		10
18	5.00	19.60	105.73	22.54	18.20	21.64	24.580	195.		6
19	5.00	13.00	67.85	28.36	11.40	27.85	19.300	200.		9
20	5.00	17.00	89.46	25.66	15.60	23.50	23.940	199.		15
21	5.00	14.80	78.53	26.75	14.60	24.35	24.890	197.		13
22	5.00	11.40	59.22	31.18	10.20	29.60	26.860	201.		13

See Swipe log on ^{14}C Swipes

Protocol # = 28
Protocol Name? 14C.RadSafety

Count Time? 5.00
2 Sigma Coincidence? yes

Radionuclide? 14C

	LL	UL	Bkg	2 Sigma%	LCR
Region A:	0.0	156.	0.00	1.0	0
Region B:	4.0	156.	0.00	1.0	0
Region C:	0.0	0.0	0.00	.00	0

Protocol # = 27 Copy Protocol #? no
Protocol Name? 3H.RadSafety
Cycles? 1
Count Time? 5.00
2 Sigma Coincidence? no
Counts/Vial? 1
Vials/Standard? 1 # Vials/Sample? 1
1st Vial Background? no
Radionuclide? 3H

	LL	UL	Bkg	2 Sigma%	LCR
Region A:	0.0	18.6	0.00	1.0	0
Region B:	2.0	18.6	0.00	1.0	0
Region C:	0.0	0.0	0.00	.00	0

Qip? tSIE ES Terminator? count
% of Reference? no
Data Mode? dpm

236

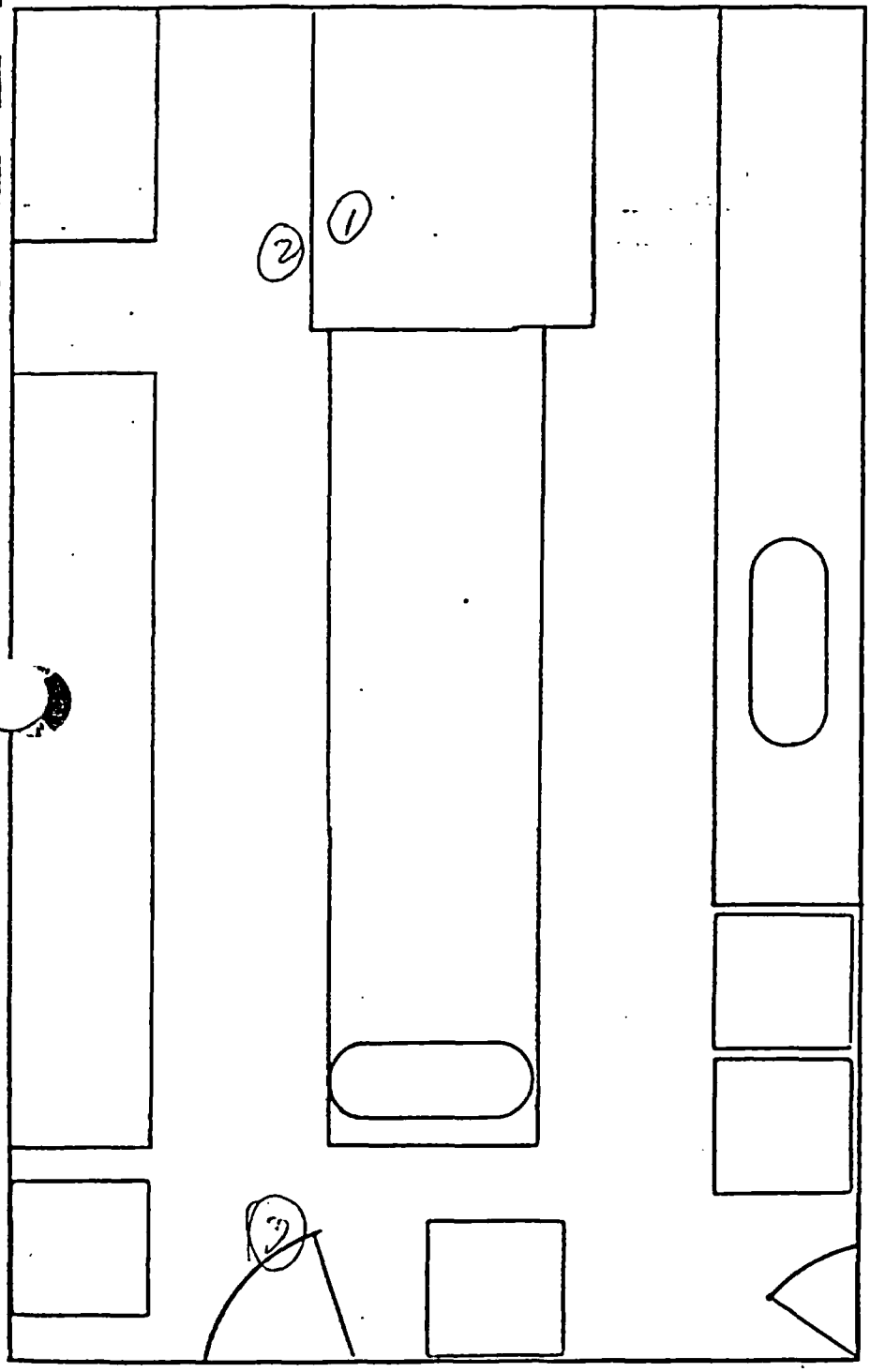
NHEERL-WED

LOG NO. 96-25

RADIATION AREA SURVEY

DATE 10/30/96

LOCATION MAIN BLDG ROOM 236



SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²	
1	100	ND	Ø net	10/30/96
2	100			10/30/96
B	100			10/30/96
1	100	ND	Ø net	10/31/96
2	100			10/31/96
3	100			
B	100			
1	100	ND	Ø net	11-4-96
2	100			
3	100			
B	100			
1	70	ND	Ø net	11-5-96
2	70			
3	70			
B	70			
1	70	ND	Ø net	11-6-96
2	70			
3	70			
B	70			
1	70	ND	Ø net	11/7/96
2	70			
3	70			
B	70			
1	70	ND	Ø net	11-12-96
2	70			
3	70			
B	70			

$LLD_{95} = \left\{\left(\frac{\sqrt{100}}{1}\right) \times 2.96\right\} + 100 = 130$ CPM

BACKGROUND 100 CPM

STANDARD (^{137}Cs Intl) 9500

INSTRUMENT Ludlum #3

SERIAL NO. 77146

*ND = Not Detectable

COMMENTS:

RADIATION SPCL: [signature]

11-12-96
DATE

U.S. Environmental Protection Agency
Western Ecology Division

NRC Radioactive Materials License No. 36-12343-02 Termination and Facility Decommissioning

Date: **November 27, 2004**
Subject: **Room Survey: Main Building 246 Final Contamination Survey.**

Description and Historic Use:

Double Lab (450 ft^2). Hydrogen-3 and carbon-14 tracers, and nickel-63 sealed sources. Used for radioactive materials handling in 2004. There is no record of leakage of any sealed sources used in this area.

Surveys:

Total (fixed + removable) and removable contamination surveys were conducted in MB 246 in November 2004. All points surveyed (46 total and 60 removable) demonstrated no significant contamination. This area meets the contamination criteria for unrestricted use based upon the isotopes used at our facilities. A HVAC duct swipe was made in November 2004 which detected no contamination.

Records for this room clearly demonstrate that contamination surveys were regularly performed, the area was not subject to any significant contamination events, and the room was maintained as a contaminate-free area. We determined it was unnecessary to conduct further contamination surveys in this area given these survey results and the Western Ecology Division's historic management of radioactive material use in this area. Records of the most recent historic surveys (i.e. prior to the final decommissioning surveys) of MB 246 are included in this report.

The survey for total contamination was conducted using a Ludlum Model 2000 Scaler equipped with a Ludlum Model 44-9, 12-cm^2 thin-window Geiger-Muller pancake detector. Removable contamination was determined using methanol-wetted swipes counted in a Packard 2200 CA dual channel Liquid Scintillation Counter.

NHEERL-WED

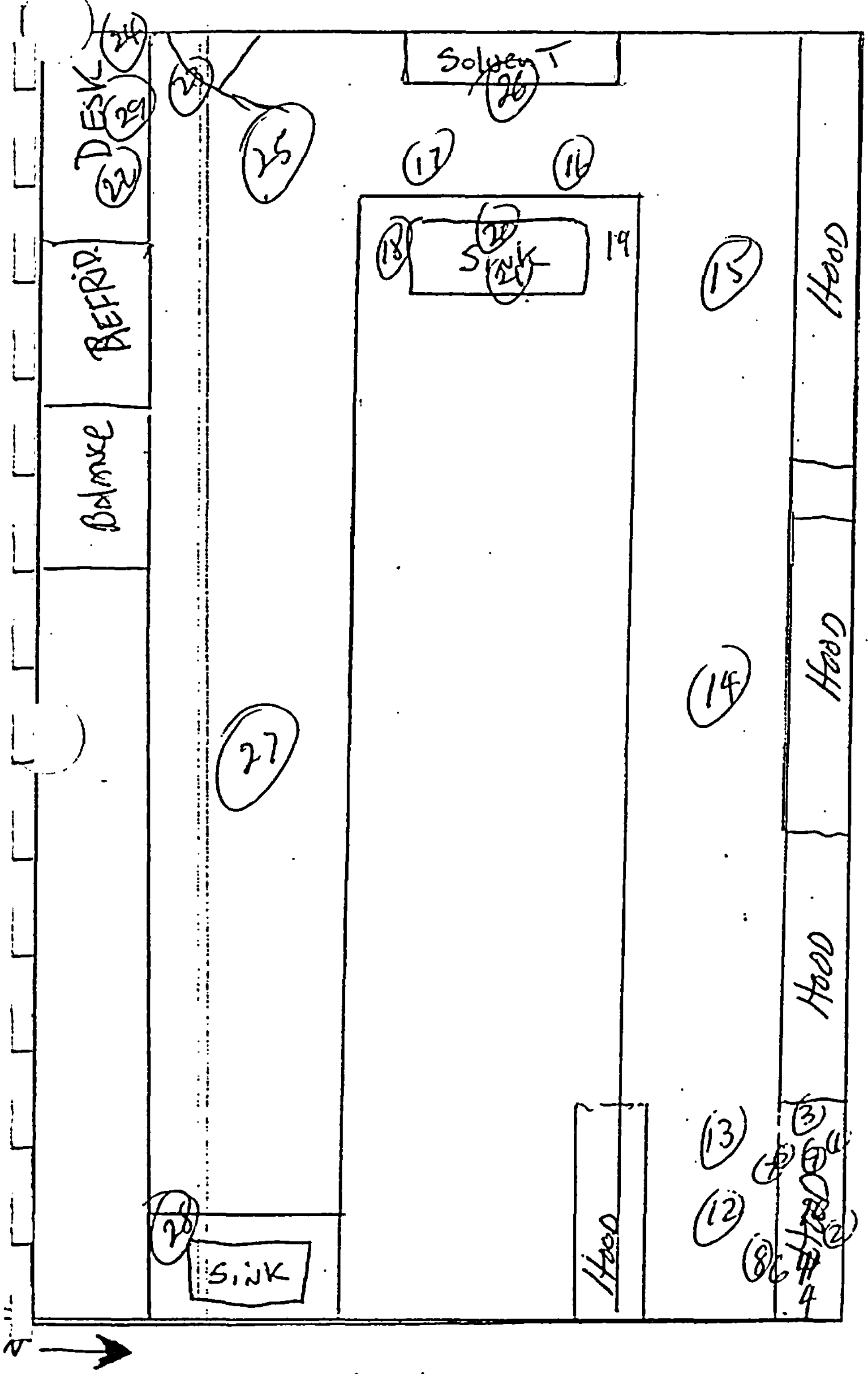
RADIATION AREA SURVEY

REMOVABLE

LOG NO. 04-21

1/2

DATE 8-11-04 LOCATION ~~ESB~~ ROOM 246



SWIPE #	GROSS CPM	NET DPM	ACTIVITY ~Bq/100 CM²
1	Bkck 41	<LLD95	ND*
2	Bkdsg 37	<LLD95	
3	Side 32		
4	Side 33		
5	SAS 437		
6	SASH 35		
7	SILL 39		
8	SILL 36		
9	Floor 37		
10	Floor 32		
11	Floor 35		
12	Floor 35		
13	Floor 38		
14	Floor 35		
15	Floor 36		
16	Floor 35		
17	Floor 36		
18	Count 43	2	3.3×10^{-2} Bq (0.9pCi)
19	Count 36	<LLD95	ND*
20	Sink 37		
21	Fix 39		
22	Phone 32		
23	Door 34		
24	Light 40		
25	Floor 36		
26	Cab 30		
27	Floor 28		
28	Count 35		
29	Desk 29		

$$LLD_{95} = \left\{ \left(\frac{\sqrt{33 \times 5}}{5} \right) \times 2.96 \right\} + \text{—} \quad \text{41 CPM}$$

BACKGROUND 33 CPM

STANDARD (^{14}C ≈ 84,000 DPM) 83,987 DPM

INSTRUMENT Packard 2200 CA

SERIAL NO. 036755

Cabs
~~Floor & Hood~~
WALLS
~~S. Floor~~

COMMENTS: "ND*" NOT DETERMINED Below the detection of the Instruments.

[signature]
RADIATION SPCL.

8-12-04
DATE

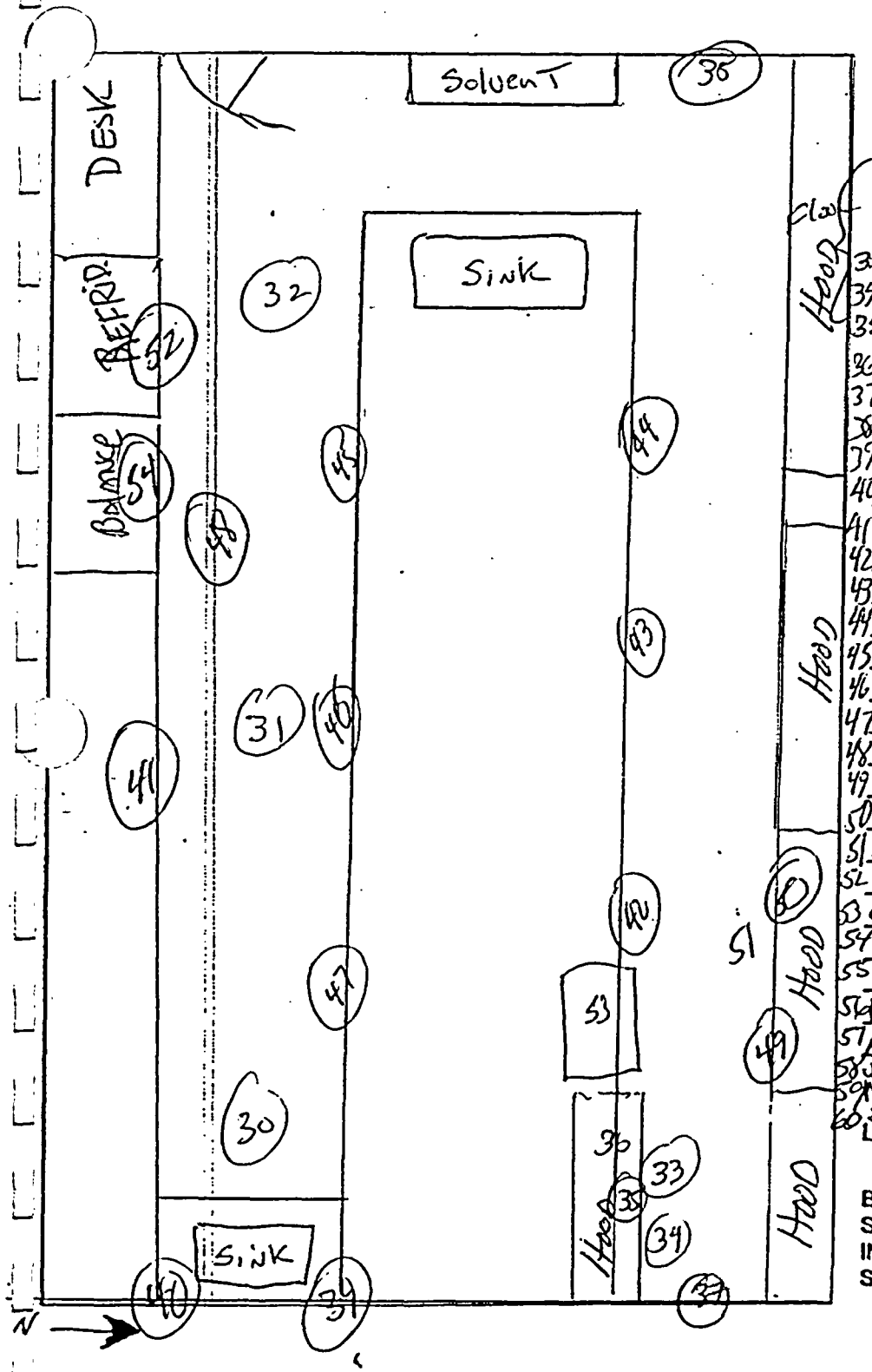
NHEERL-WED

RADIATION AREA SURVEY

Removable

LOG NO. 04-21 2/2

DATE 8-11-04 LOCATION ~~GSB~~ ROOM 246



SWIPE #	GROSS CPM	NET DPM	ACTIVITY ~Bq/100 CM²
30	34	LLD95	ND*
31	41	LLD95	
32	29		
33 STEEL	37		
34 CASH	40		
35 SASH	30		
36 SILL	37		
37 WALL	39		
38 WALL	32		
39 WALL	39		
40 WALL	38		
41 WALL	30		
42 CAB	38		
43 CAB	40		
44 CAB	30		
45 CAB	37		
46 CAB	32		
47 CAB	38		
48 CAB	39		
49 SASH	38		
50 SILL	32		
51 FLOOR	41	LLD95	
52 REFER	35		
53 OVEN	45		
54 TRAY	34		
55 TRAY	40		
56 VENT	40		
57 PLATE	34		
58 JACK	49	8	4 pCi
59 MANTLE	47	7	3 pCi
60 SS TRAY 35			

$LLD_{95} = \left\{ \left(\sqrt{\quad} \right) \times 2.96 \right\} + \quad = \text{CPM}$

BACKGROUND _____

STANDARD ( ) _____

INSTRUMENT _____

SERIAL NO. _____

COMMENTS:

_____ RADIATION SPCL.

_____ DATE

Protocol #:28 Name:14C.RadSafety 12-Aug-~~99~~ 04 10:20
Region A: LL-UL= 0.0-156. Lcr= 0 Bkg= 0.00 %2 Sigma=1.00
Region B: LL-UL= 4.0-156. Lcr= 0 Bkg= 0.00 %2 Sigma=1.00
Region C: LL-UL= 0.0- 0.0 Lcr= 0 Bkg= 0.00 %2 Sigma=0.00
Time = 5.00 QIP = tSIE ES Terminator = Count
14C.QuenchCurve
Conventional DPM
Nuclide 1 = 113700
Luminescence Correction On

S#	TIME	CPMA	DPM1	A:2S%	CPMB	B:2S%	SIS	tSIE	FLAG	LUM	
1	5.00	20.40	21.27	21.47	13.20	24.61	69.450	683.			BKGRD / BKG SCALED
2	2.53	36191.7	38146.0	0.66	15811.9	0.99	14.110	618.		0	3H STD
3	0.52	80621.2	83987.7	0.97	77044.2	0.99	120.54	698.		0	14C STD 84,000 dpm
4	5.00	33.00	37.24	16.75	25.80	17.60	92.890	273.		5	
(8 missing vials)											
13	5.00	367.60	403.86	4.69	313.40	5.05	71.090	413.		0	148
14	5.00	1273.60	1402.20	2.52	888.40	3.00	53.100	394.	3H STD	0	1216
~~15~~	~~5.00~~	~~5221.00~~	~~5746.73~~	~~1.24~~	~~2123.80~~	~~1.94~~	~~22.750~~	~~397.~~		~~1~~	~~1~~
(1 missing vial)											
17	5.00	124.80	137.92	8.09	113.40	8.39	74.790	364.		0	121
18	5.00	1046.00	1151.32	2.77	973.20	2.86	76.750	397.	14C STD	0	1195
19	5.00	8621.00	9497.25	0.96	8001.40	0.99	75.280	389.		0	11055
20	0.57	76231.6	83980.0	0.96	70975.4	0.99	75.280	389.		0	111
(10 missing vials)											
31	5.00	32.60	36.78	16.59	27.40	17.08	61.560	274.	BKGRD	3	
32	5.00	40.80	46.49	14.34	33.00	15.56	59.290	251.		1	
33	5.00	37.40	42.64	15.60	30.80	16.11	72.490	250.		3	
34	5.00	32.40	37.06	16.56	27.00	17.21	73.120	244.		3	
35	5.00	33.00	37.40	16.12	27.60	17.02	70.030	263.		5	
36	5.00	38.80	44.25	14.79	31.40	15.96	61.180	250.		1	
37	5.00	35.40	41.71	15.53	28.80	16.66	61.380	208.		1	
38	5.00	38.60	45.50	14.98	32.20	15.76	76.620	208.		1	
39	5.00	35.80	40.90	15.68	28.60	16.72	80.270	246.		2	
40	5.00	37.20	43.22	15.35	32.20	15.76	67.780	223.		2	
41	5.00	32.40	37.74	16.56	27.40	17.08	56.780	220.		3	
42	5.00	35.00	40.58	15.95	30.60	16.16	75.000	225.		4	
43	5.00	34.80	39.63	15.76	29.20	16.55	71.890	252.		1	
44	5.00	37.80	42.87	15.00	30.20	16.27	70.880	261.		1	
45	5.00	35.40	40.26	15.53	27.80	16.96	68.250	255.		1	

Protocol #:28 Name:14C.RadSafety 12-Aug-~~99~~ 04 12:45
Region A: LL-UL= 0.0-156. Lcr= 0 Bkg= 0.00 %2 Sigma=1.00
Region B: LL-UL= 4.0-156. Lcr= 0 Bkg= 0.00 %2 Sigma=1.00
Region C: LL-UL= 0.0- 0.0 Lcr= 0 Bkg= 0.00 %2 Sigma=0.00
Time = 2.00 QIP = tSIE ES Terminator = Count
14C.QuenchCurve
Conventional DPM
Nuclide 1 = 113700
Luminescence Correction On

S#	TIME	CPMA	DPM1	A:2S%	CPMB	B:2S%	SIS	tSIE	FLAG	LUM
15 46	3.55	32.39	36.70	19.44	28.73	19.80	66.600	264.		3
47	2.00	32.50	36.75	26.28	29.50	26.03	75.060	268.		2
48	2.00	35.50	40.33	25.66	30.50	25.60	74.550	257.		3
49	2.00	42.50	49.05	23.41	36.50	23.40	72.110	230.		4
50	2.00	36.00	43.40	23.57	28.00	26.72	56.620	187.		0
20 51	2.00	36.50	42.20	25.84	33.00	24.61	66.040	228.		4
52	2.00	39.00	44.20	22.64	32.00	24.99	68.500	263.		0
53	2.00	32.00	36.11	27.24	30.50	25.60	89.950	273.		2
54	2.00	34.00	38.68	25.30	30.50	25.60	77.740	254.		3
55	2.00	39.50	44.48	22.50	33.00	24.61	95.040	279.		0
25 56	2.00	26.00	29.69	30.76	21.50	30.49	68.270	247.		4
57	2.00	30.00	34.00	27.48	26.00	27.73	55.420	263.		7
58	2.00	27.50	35.15	30.20	23.00	29.48	74.380	137.		6
59	2.00	32.50	37.74	24.80	27.00	27.21	71.630	223.		0
60	2.00	28.50	32.02	26.49	24.50	28.57	79.400	284.		0
30 61	2.00	33.50	37.79	27.52	26.00	27.73	68.410	274.		6
62	2.00	40.50	45.81	24.56	37.00	23.24	75.730	267.		8
63	2.00	29.00	32.72	26.26	25.00	28.28	77.150	274.		0
64	2.00	37.00	41.73	24.77	31.50	25.19	84.710	275.		3
65	2.00	40.00	45.23	23.97	35.50	23.73	83.070	268.		3
35 66	2.00	29.50	36.57	30.12	22.00	30.15	60.280	159.		10
67	2.00	37.00	44.38	24.77	30.00	25.81	67.360	192.		1
68	2.00	38.50	46.09	25.04	32.50	24.80	65.110	193.		4
69	2.00	32.00	37.10	27.95	26.00	27.73	76.060	225.		5
70	2.00	39.00	47.34	24.32	34.00	24.25	97.490	181.		1
40 71	2.00	37.50	42.65	24.87	31.50	25.19	71.000	255.		3
72	2.00	29.50	33.72	29.35	22.50	29.81	75.890	245.		7
73	2.00	38.00	42.89	24.11	34.50	24.07	91.520	272.		1
74	2.00	39.50	44.86	24.93	33.00	24.61	72.280	258.		5
75	2.00	30.00	34.82	29.81	25.50	28.00	63.580	224.		11
45 76	2.00	37.00	41.98	25.35	31.00	25.40	80.070	260.		3
77	2.00	31.50	35.83	28.57	27.50	26.96	77.440	255.		6
78	2.00	38.00	43.06	22.94	28.00	26.72	61.240	263.		0
79	2.00	38.50	43.54	22.79	33.00	24.61	63.940	268.		0
80	2.00	38.00	45.63	24.68	32.50	24.80	65.530	191.		6
50 81	2.00	31.50	36.91	27.85	24.00	28.86	61.290	214.		3
82	2.00	40.50	46.06	23.81	32.50	24.80	58.530	255.		3
83	2.00	35.00	39.79	25.55	32.00	24.99	60.320	256.		5
84	2.00	44.50	50.94	22.80	40.50	22.22	87.400	242.		2
85	2.00	33.50	38.34	26.53	27.50	26.96	55.140	243.		2
55 86	2.00	39.50	44.39	23.88	32.50	24.80	54.500	284.		1
87	2.00	40.00	44.98	24.23	33.00	24.61	61.410	282.		5
88	2.00	34.00	38.74	25.97	29.50	26.03	59.520	251.		3
89	2.00	48.50	54.63	21.72	40.50	22.22	61.080	278.		2
90	2.00	47.00	52.98	22.11	41.50	21.95	65.890	276.		3
60 91	2.00	35.00	39.74	25.87	30.00	25.81	61.280	259.		2

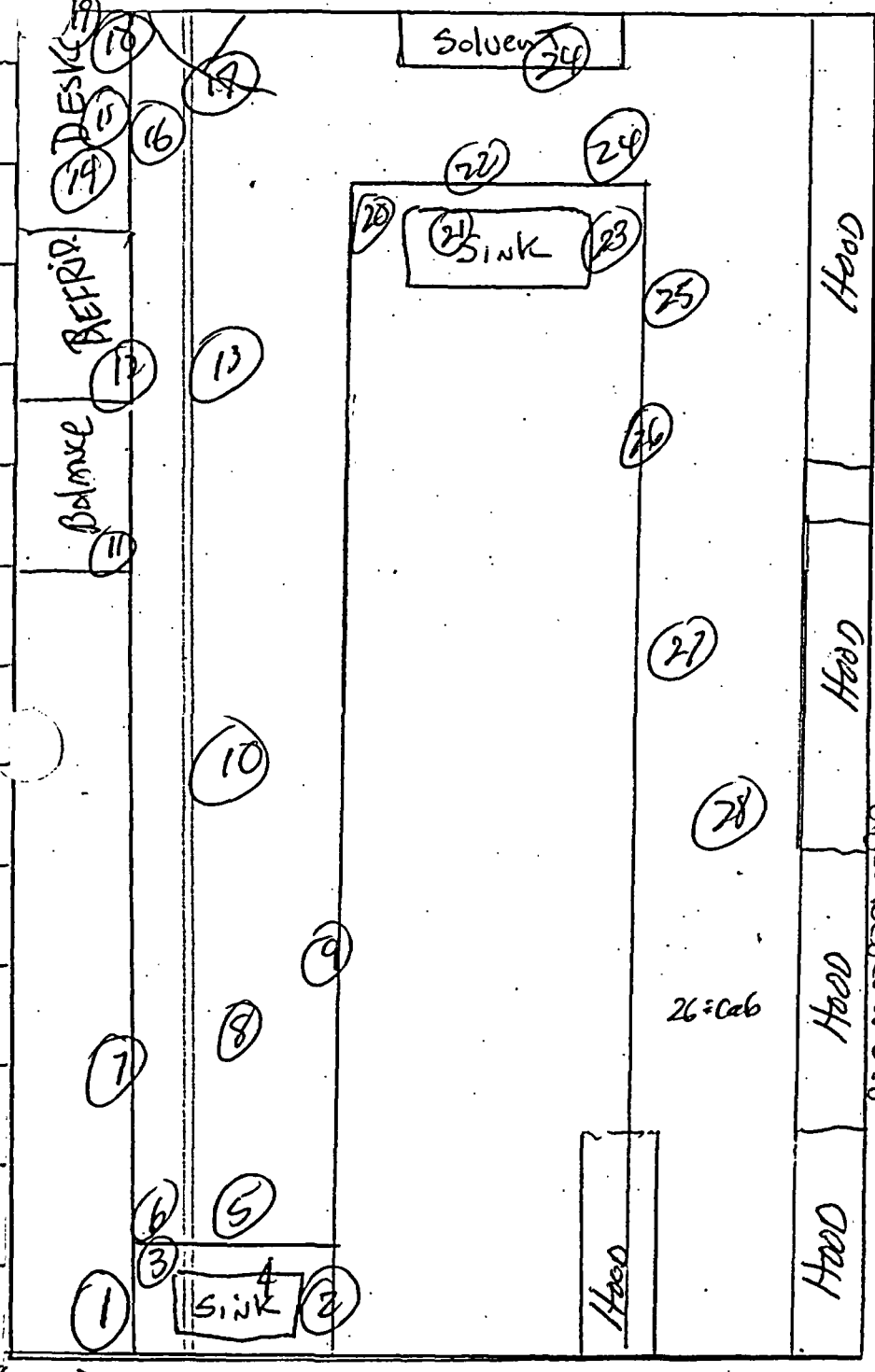
NHEERL-WED

RADIATION AREA SURVEY

LOG NO. 04-22 1/2

DATE 8/18/04 (FIXED)

LOCATION CSB ROOM 246



SWIPE #	GROSS CPM	NET DPM	ACTIVITY ~Bq/100 CM²
1 WALL	90	LLD95	ND*
2 WALL			
3 Count.			
4 Sink			
5 Floor			
6 Cab			
7 WALL			
8 Floor			
9 Cab			
10 Floor			
11 TABLE			
12 Refer			
13 Floor			
14 phone			
15 DESK			
16 Floor			
17 Door			
18 Ledge			
19 WALL			
20 Count			
21 Sink			
22 Floor			
23 Count			
24 Floor			
25 Floor			
26 Floor			
27 Floor			
28 Floor			

$LLD_{95} = \left\{ \left(\frac{\sqrt{90}}{1} \right) \times 2.96 \right\}^2 + 90 = 118.6$ CPM

BACKGROUND 90 CPM

STANDARD (137Cs) Luli 9500 CPM

INSTRUMENT Ludlum #3

SERIAL NO. 77176

COMMENTS: * ND = NOT DETERMINED BELOW THE DETECTION Limit of the Instrument.

D.A. Mon
RADIATION SPCL.

8-12-04
DATE

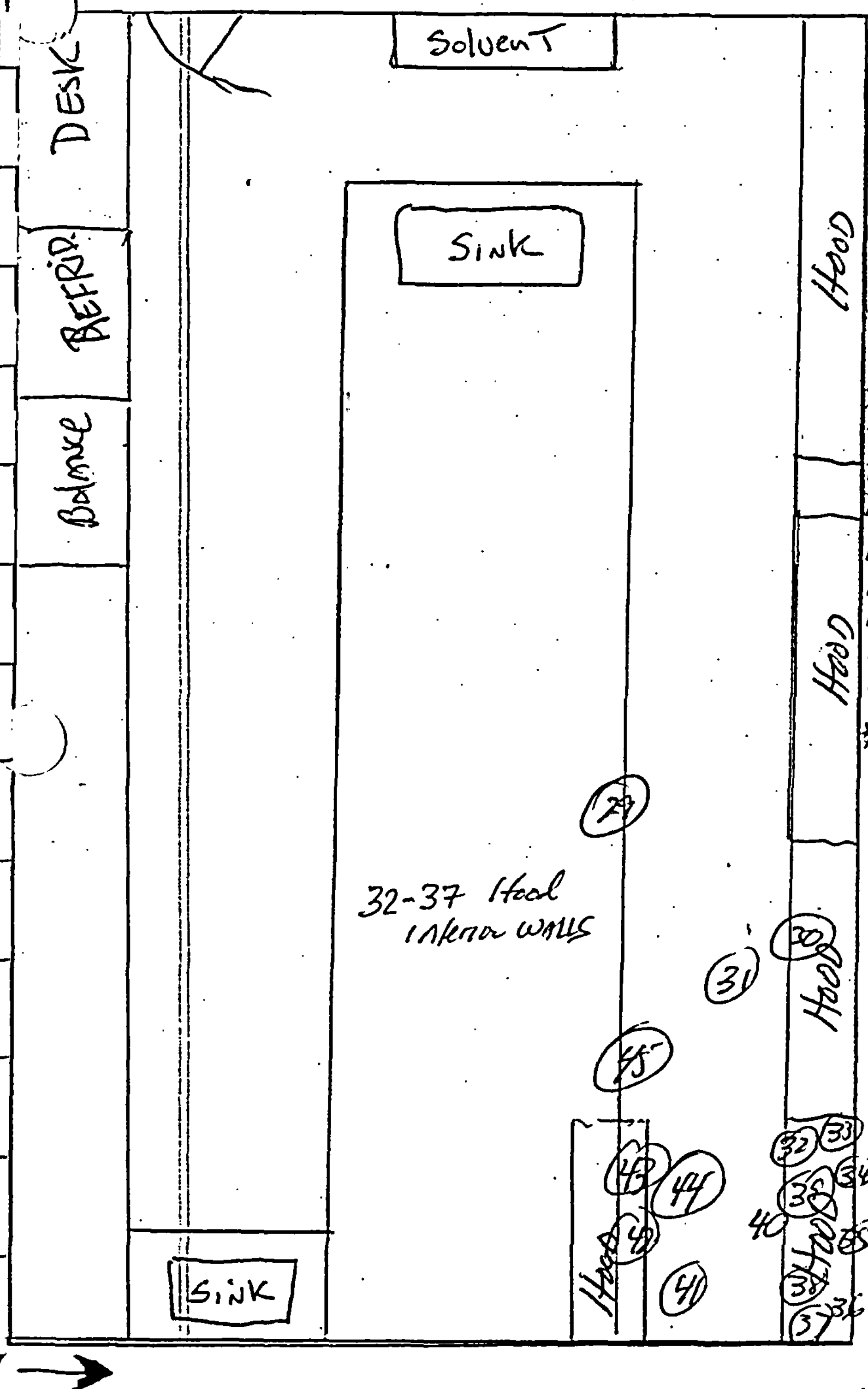
NHEERL-WED

RADIATION AREA SURVEY

LOG NO. 04-22 2/2

Fixed

DATE 8-11-04 LOCATION [struck through] ROOM 246



SWIPE #	GROSS CPM	NET DPM	ACTIVITY ~Bq/100 CM^2
29 Cab	90	<LLD95	ND*
30 Sill			
31 Floor			
32 Hood			
33 Hood			
34 Hood			
35 Hood			
36 Hood			
37 Hood			
38 Sill			
39 Sill			
40 Floor			
41 Floor			
42 Sill			
43 Sill			
44 Floor			
45 Cab			
*Tray	130	+	+

$LLD_{95} = \{(\sqrt{90}) \times 2.96\} + =$ CPM

BACKGROUND 90 CPM

STANDARD (^{137}Cs 2 μCi) 9500 CPM

INSTRUMENT Ludlum #3

SERIAL NO. 77776

COMMENTS: *Fiberglass large tray 130 cpm. + Will Clean + resurvey. IF still contaminated, will cut out contaminated section.

RADIATION SPCL. [signature]

DATE 8-12-04

NHEERL-WED

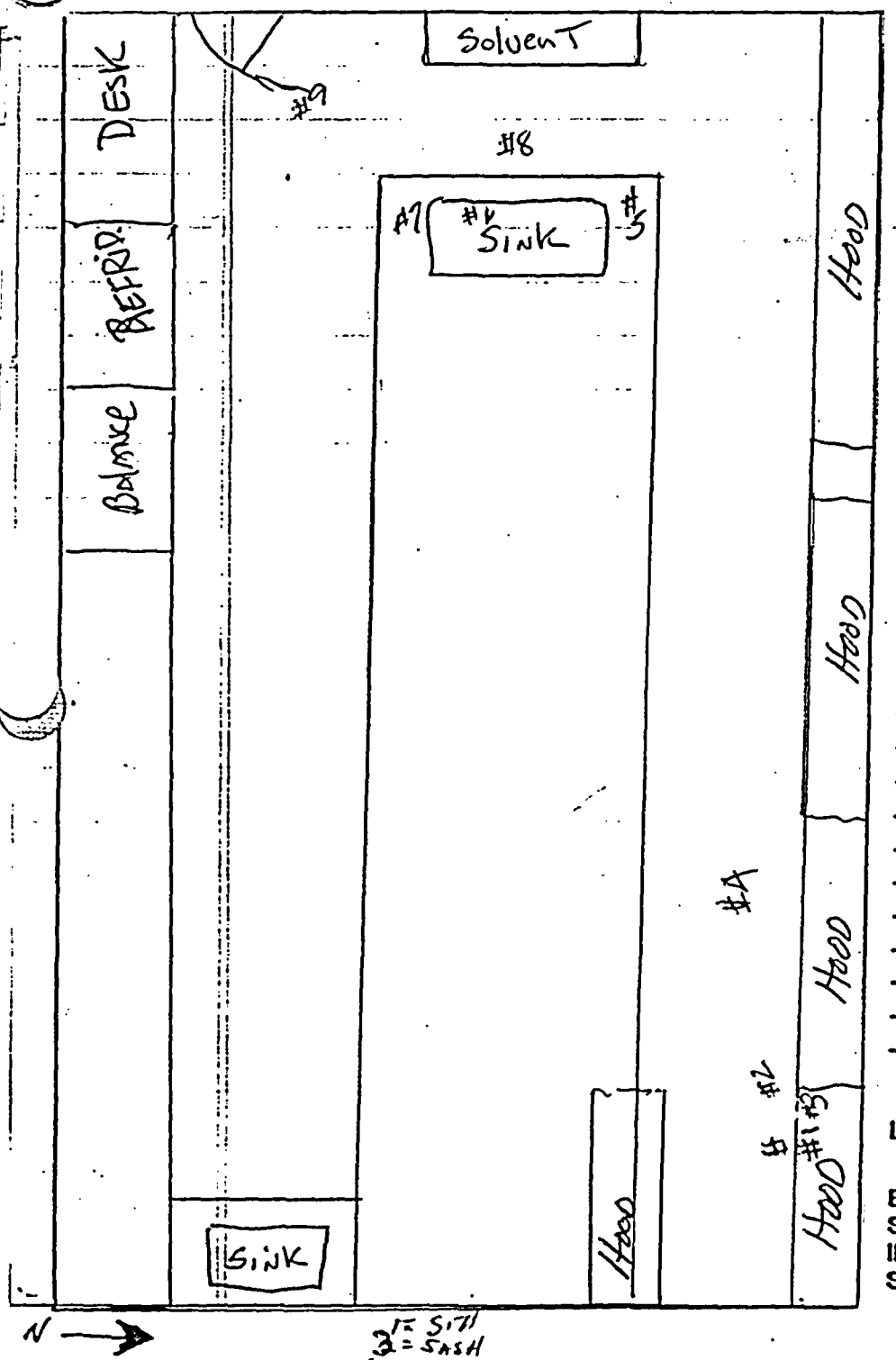
RADIATION AREA SURVEY

REMOVABLE - LSC

LOG NO. 04-13 2/4

DATE 6-8-04 LOCATION CSB ROOM 246

3H



SWIPE #	GROSS CPM	NET DPM	ACTIVITY ~Bq/100 CM²
1	7	LLD95	ND*
2	5		
3	7		
4	6		
5	5		
6	11		
7	4		
8	9		
9	6		

$LLD_{95} = \left\{ \left(\frac{\sqrt{3 \times 10}}{3} \right) \times 2.96 \right\} + 16 \text{ CPM} = \text{CPM}$

BACKGROUND 10.33 CPM

STANDARD (^3H 64,179 DPM) 73,375 dpm

INSTRUMENT Packard 2200CA

SERIAL NO. 036755

COMMENTS: *ND = NOT DETERMINED. BELOW THE DETECTION LIMITS OF THE INSTRUMENT.

RADIATION SPCL. 6/13/04 DATE

No Contamination

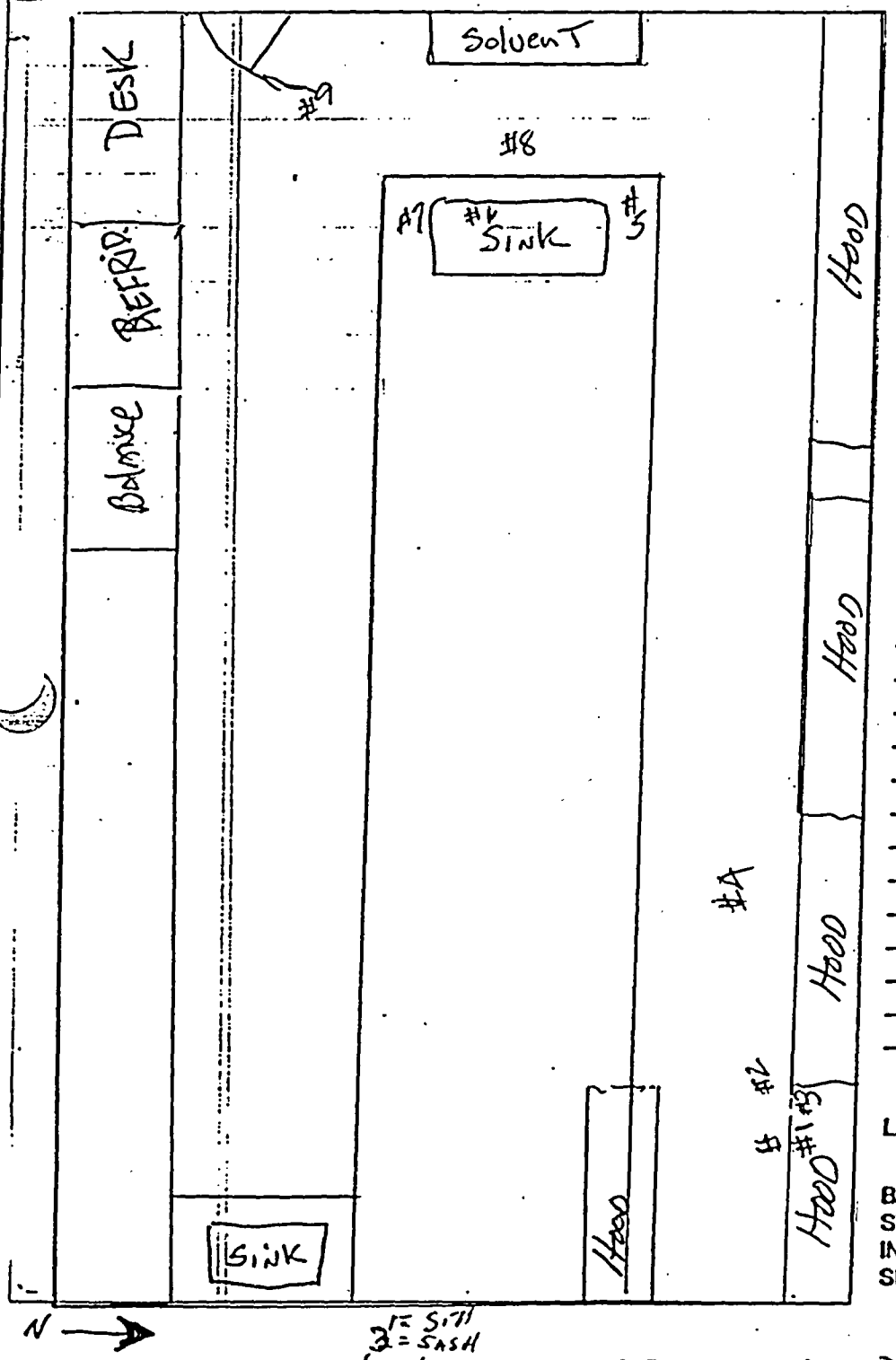
NHEERL-WED

RADIATION AREA SURVEY

REMOVABLE – LSC

LOG NO. 04-B 4/4

DATE 6-8-04 LOCATION CSB ROOM 146



SWIPE #	GROSS CPM	NET DPM	ACTIVITY ~Bq/100 CM²
1	35	LLD_{95}	ND*
2	23		
3	33		
4	32		
5	27		
6	31		
7	25		
8	29		
9	27		

$$LLD_{95} = \left\{\left(\frac{\sqrt{31.33 \times 3}}{3}\right) \times 2.96\right\} + 4 = 41 \text{ CPM}$$

BACKGROUND 31.33
STANDARD (14C 84,000 DPM) 84,944 DPM
INSTRUMENT Packard 2200 CA
SERIAL NO. 036755

COMMENTS: *ND= NOT DETERMINED. BELOW the DETECTION Limits OF the INSTRUMENT.

RADIATION SPCL. 6/13/04 DATE

NO CONTAMINATION

87-27

AREA CONTAMINATION SURVEY SHEET

Radionuclide(s) Surveyed: ^{14}C

Date: 10-13-87

Method of Detection: LSC

Q. Monaco
Radiation Safety Technician

Wipe #	Location RM #	Area	Nuclide: NET CPM	NET DPM	µCi	Nuclide: NET CPM	NET DPM	µCi
	190	Door	0					
	190	Floor	2	< LLD95				
	190	Sink bench	7	< LLD95				
	190	E Bench	0					
	190	W Bench	0					
	190	N Bench	0					
	246	under hood sill	0					
	"	hood left	30	35				
	"	hood ~~Etc~~ bottom	8	~~9~~ < LLD95				
	"	hood sash	0					
	"	hood floor	6	~~8~~ < LLD95				
	"	door	5	~~6~~ < LLD95				

Calculation of Lower Limits of Detection (LLD)

	Nuclide: ^{14}C	Nuclide:
Gross Background Counts:	~~25~~ 75	
Total Background Count time:	3'	

$$LLD\ (95\%) = \sqrt{\frac{\text{Gross Background Counts}}{\text{Count Time}}} \times 4.66$$

LLD (95%) = 14

REMARKS:

246

AREA CONTAMINATION SURVEY SHEET

Radionuclide(s) Surveyed: ^{14}C Date: 9-24-87

Method of Detection: LSC

Radiation Safety Technician

Swipe #	Location RM #	Area	Nuclide: NET CPM	NET DPM	µCi	Nuclide: NET CPM	NET DPM	µCi	
3	256	E-Floor	0						
4		W-Floor	2						
5		S-Bench top	0						
6		Door	0						
7	246	N-Floor	12	15					
8		Hood	30	36					
9		Hood	123	144					
10		W-Floor	1	<LLD					
11		E-Floor	0						
12		SW Floor	0						
13		E(S) Bench top	0						
14		DESK	0						
15		Door	10	12					
16	236	Door	0						
17		Floor - W	9	10					
18	228	Door Floor =	29	33					

Calculation of Lower Limits of Detection (LLD)

Nuclide: _____ Nuclide: _____

Gross Background Counts: _____ _____

Total Background Count time: _____ _____

$$LLD\ (95\%) = \frac{\sqrt{\text{Gross Background Counts}}}{\text{Count Time}} \times 4.66$$

LLD (95%)= _____ _____

REMARKS:

Rm 246 7-18-87

```
PROGRAM #:    6
REGION A:    LL-UL=    2- 156  LCR=     0  BKG=    18  %-2 SIGMA=    .2
REGION B:    LL-UL=    4- 156  LCR=     0  BKG=     0  %-2 SIGMA=    .2
NUCLIDE 1 =  36900
TIME=   1.00  QIP= SIE/AEC SCR= B/A   K= 1.000
```

P#	S#	TIME	CPMA/K DPM1/K	%DEV	CPMB/K DPM2/K	%DEV	QIP	FLAGS	SCR	MIN	
											Bench top
6	1	1.00	2.00 2.35	44.7	19.00 .00	45.8	504.	L1?	9.500 .000	2	
6	2	1.00	7.00 8.26	40.0	24.00 .00	40.8	493.	L ?	3.429 .000	4	Floor
6	3	1.00	7.00 8.12	40.0	23.00 .00	41.7	549.	L ?	3.286 .000	6	door Floor

Leaking Waste Container

AREA CONTAMINATION SURVEY SHEET

Radionuclide(s) Surveyed: ^{14}C Date: 7-17-87

Method of Detection: LSC

Radiation Safety Technician

Swipe #	Location RM #	Location Area	Nuclide: NET CPM	Nuclide: NET DPM	Nuclide: µCi	Nuclide: NET CPM	Nuclide: NET DPM	Nuclide: µCi
101	236	S Hood FL.	0					
102		Refer NW	0					
103		Refer SW	0					
104	246	Door	0					
105		Door Fl	0					
1~~05~~ 1		Seq. Hood Floor	22	28				
2	252	Door	0					
3		W Floor	0					
4		LSC Desk Area	0					
5		Phone	0					
6		N E Floor	4	5				
7		Hood	0					
8		Oxidizer	0					
9		refer	24	27				

Calculation of Lower Limits of Detection (LLD) Nuclide: Nuclide:

Gross Background Counts:
Total Background Count time:

$$\text{LLD (95\%)} = \sqrt{\frac{\text{Gross Background Counts}}{\text{Count Time}}} \times 4.66$$

LLD (95%)=

REMARKS:

U.S. Environmental Protection Agency
Western Ecology Division

NRC Radioactive Materials License No. 36-12343-02 Termination and Facility Decommissioning

Date: **November 27, 2004**
Subject: **Room Survey: Main Building 248 Final Contamination Survey.**

Description and Historic Use:

Large one and one-half lab (350 ft^2) shared with MB 250. Potentially hydrogen-3 and carbon-14 tracers and nickel-63 sealed sources. No tracer use since prior to 1986. There is no record of leakage of any sealed sources used in this area.

Surveys:

Total (fixed + removable) and removable contamination surveys were conducted in MB 248 in November 2004. All points surveyed (8 total and 8 removable) demonstrated no contamination. This area meets the contamination criteria for unrestricted use based upon the isotopes used at our facilities. .

Records for this room clearly demonstrate that contamination surveys were regularly performed, the area was not subject to any significant contamination events, and the room was maintained as a contaminate-free area. We determined it was unnecessary to conduct further contamination surveys in this area given these survey results and the Western Ecology Division's historic management of radioactive material use in this area. Records of the most recent historic surveys (i.e. prior to the final decommissioning surveys) of MB 248 are included in this report.

The survey for total contamination was conducted using a Ludlum Model 2000 Scaler equipped with a Ludlum Model 44-9, 12-cm^2 thin-window Geiger-Muller pancake detector. Removable contamination was determined using methanol-wetted swipes counted in a Packard 2200 CA dual channel Liquid Scintillation Counter.

NHEERL-WED

LOG NO. DA-23

RADIATION AREA SURVEY

FIXED SURVEY

DATE 11-11-04 LOCATION MB ROOM 248

INSTRUMENT Ludlum 2000 Scaler Pancake Probe 44-9

SERIAL NO. 83810 / PR070834

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
1	24	LLD95	ND
2	38		
3	35		
4	28		
5	54		
6	36		
7	50		
8	32		

$LLD_{95} = \left\{\left(\frac{\sqrt{38}}{0.5}\right) \times 2.96\right\}\% = 113$ CPM

BACKGROUND STANDARD (^{14}C 0.16 µCi) 76 CPM / 19540 CPM, 2.8% eff.

Time 0.5'

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²

$LLD_{95} = \left\{\left(\text{-------}\right) \times 2.96\right\} + = $ CPM

BACKGROUND STANDARD ( ) _____

COMMENTS:

Donna
RADIATION SPCL.

11-16-04
DATE

NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY

DATE 11-11-04 LOCATION MB ROOM 248

INSTRUMENT PACKARD LSC 2200 CA

SERIAL NO. Ø36755

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
1	2	LLD95	ND
2	4		
3	3		
4	3		
5	2		
6	5		
7	3		
8	3		

$LLD_{95} = \{(\quad) \times 2.96\} +$ = 7 CPM

BACKGROUND STANDARD (3H 64,179 DPM) 4 CPM = 56,056 DPM

87% eff.

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
	9	LLD95	ND
	12		
	12		
	17		
	13		
	16		
	14		
	13		

$LLD_{95} = \{(\quad) \times 2.96\} +$ = 30 CPM

BACKGROUND STANDARD (1% 89,000 DPM) 22 CPM = 85,603 DPM

102% eff

COMMENTS:

J Moran
RADIATION SPCL.

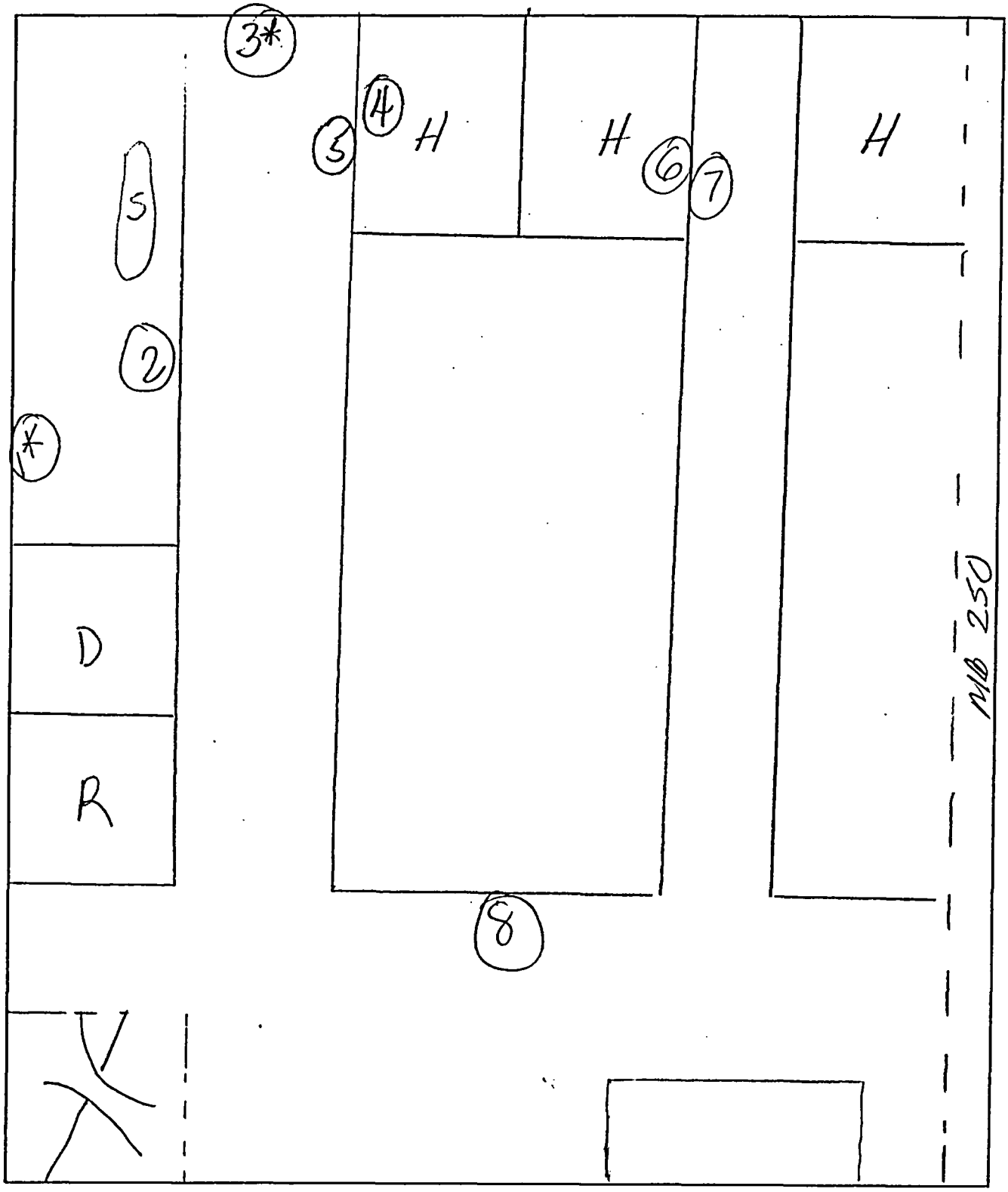
11-18-04
DATE

NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY MAP

LOCATION MB ROOM 248



248

AREA CONTAMINATION SURVEY SHEET

Radionuclide(s) Surveyed: ^{14}C Date: 8-12-87

Method of Detection: LSC

P. Moore
Radiation Safety Technician

Swipe #	Location RM #	Area	Nuclide: NET CPM	NET DPM	µCi	Nuclide: NET CPM	NET DPM	µCi
6	258	door	0					
7		Refridgerator	15	17				
8		floor	3	<				
9		LSC	3	<				
10		chamber 1	0					
11		2	0					
12	256	door	0					
13		Phone	0					
14		floor	0					
15		LSC	1	<				
16		refridgalin	0					
17	248	door	2	<				
		floor	0					
		phone	0					
		Sink	0					

Calculation of Lower Limits of Detection (LLD) Nuclide: ^{14}C Nuclide:

Gross Background Counts:
Total Background Count time:

$$\text{LLD (95\%)} = \sqrt{\frac{\text{Gross Background Counts}}{\text{Count Time}}} \times 4.66$$

LLD (95%)= 5

REMARKS:

248

87-20

AREA CONTAMINATION SURVEY SHEET

Radionuclide(s) Surveyed: ^{14}C / ^{3}H Date: 8-7-87

Method of Detection: LSC

Phil Monaco
Radiation Safety Technician

Swipe #	Location RM #	Area	Nuclide: ^{3}H NET CPM	NET DPM	µCi	Nuclide: ^{14}C NET CPM	NET DPM	µCi	
92		Hexazinone				5.87	6.8		
93		Hexazinone				0			
94	190	door	0			0			
95		Bench top	0			8.3	9		
96		Bench top	0			5	5		
* 1		Bench top (SINK)	49	138		179	205		
* 2		Bench top ~~sink fixture~~	30	91		80	92		
3		SINK FIX ~~floor~~	13	37		73	84		
4		floor	0			0			
5		floor	0			0			

Calculation of Lower Limits of Detection (LLD)

	Nuclide: ^{3}H	Nuclide: ^{14}C
Gross Background Counts:	144	454
Total Background Count time:	10	40

$$LLD\ (95\%) = \frac{\sqrt{\text{Gross Background Counts}}}{\text{Count Time}} \times 4.66$$

LLD (95%)=	5.6	4.9

REMARKS:

U.S. Environmental Protection Agency
Western Ecology Division

NRC Radioactive Materials License No. 36-12343-02 Termination and Facility Decommissioning

Date: **November 27, 2004**
Subject: **Room Survey: Main Building 250 Final Contamination Survey.**

Description and Historic Use:

Large one and one-half lab (350 ft^2) shared with MB 248. Potentially hydrogen-3 and carbon-14 tracers and nickel-63 sealed sources. No tracer use since prior to 1986. There is no record of leakage of any sealed sources used in this area.

Surveys:

Total (fixed + removable) and removable contamination surveys were conducted in MB 250 in November 2004. All points surveyed (9 total and 9 removable) demonstrated no significant contamination. Two points indicated very low levels of removable contamination from tritium (0.33 – 0.60 Bq/100 cm^2). All other sampling points were at background. This area meets the contamination criteria for unrestricted use based upon the isotopes used at our facilities. This area meets the contamination criteria for unrestricted use based upon the isotopes used in this area.

Records for this room clearly demonstrate that contamination surveys were regularly performed, the area was not subject to any significant contamination events, and the room was maintained as a contaminate-free area. We determined it was unnecessary to conduct further contamination surveys in this area given these survey results and the Western Ecology Division's historic management of radioactive material use in this area. Records of the most recent historic surveys (i.e. prior to the final decommissioning surveys) of MB 250 are included in this report.

The survey for total contamination was conducted using a Ludlum Model 2000 Scaler equipped with a Ludlum Model 44-9, 12-cm^2 thin-window Geiger-Muller pancake detector. Removable contamination was determined using methanol-wetted swipes counted in a Packard 2200 CA dual channel Liquid Scintillation Counter.

NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY

FIXED SURVEY

DATE 11-11-04 LOCATION 2MB ROOM M1250

INSTRUMENT Ludlum 2000 Scaler Pancake Probe 44-9

SERIAL NO. 83810 / PR070834

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM^2
1	35	<LLD95	ND
2	60	↓	↓
3	38	↓	↓
4	44	↓	↓
5	36	↓	↓
6	56	↓	↓
7	40	↓	↓
8	54	↓	↓
9	50	↓	↓

$LLD_{95} = \left\{ \left(\frac{\sqrt{38}}{0.5} \right) \times 2.96 \right\} 76 = 113$ CPM

BACKGROUND 76 CPM

STANDARD (^{14}C 0.168 µCi) 10,340 CPM 2.8% eff.

Time 0.5'

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM^2

$LLD_{95} = \left\{ \left(\text{---------} \right) \times 2.96 \right\} + =$ CPM

BACKGROUND ______

STANDARD ( ) ______

COMMENTS:

D Monan
RADIATION SPCL.

11-16-04
DATE

NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY

DATE 11-11-04 LOCATION MB ROOM 250

INSTRUMENT Packard LSC 2200 CA

SERIAL NO. ~~0388~~ 036755

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
1	4	<LLD95	ND
2	4	↓	ND
3	12	36	0.60
4	3	<LLD95	ND
5	2	↓	ND
6	7	20	0.33
7	5	<LLD95	ND
8	3	↓	ND
9	5	↓	ND

$LLD_{95} = \{(\quad) \times 2.96\} + = 7$ CPM

BACKGROUND STANDARD (^3H 64,179 dpm) 4 CPM = 56,056 dpm

87% eff

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
	12	<LLD95	ND
	15	↓	↓
	13		
	13		
	15		
	11		
	14		
	13		
	17		

$LLD_{95} = \{(\quad) \times 2.96\} + = 30$ CPM

BACKGROUND STANDARD (^{14}C 84,000 dpm) 22 CPM = 85,603 dpm

102% eff

COMMENTS:

D. Monaco
RADIATION SPCL.

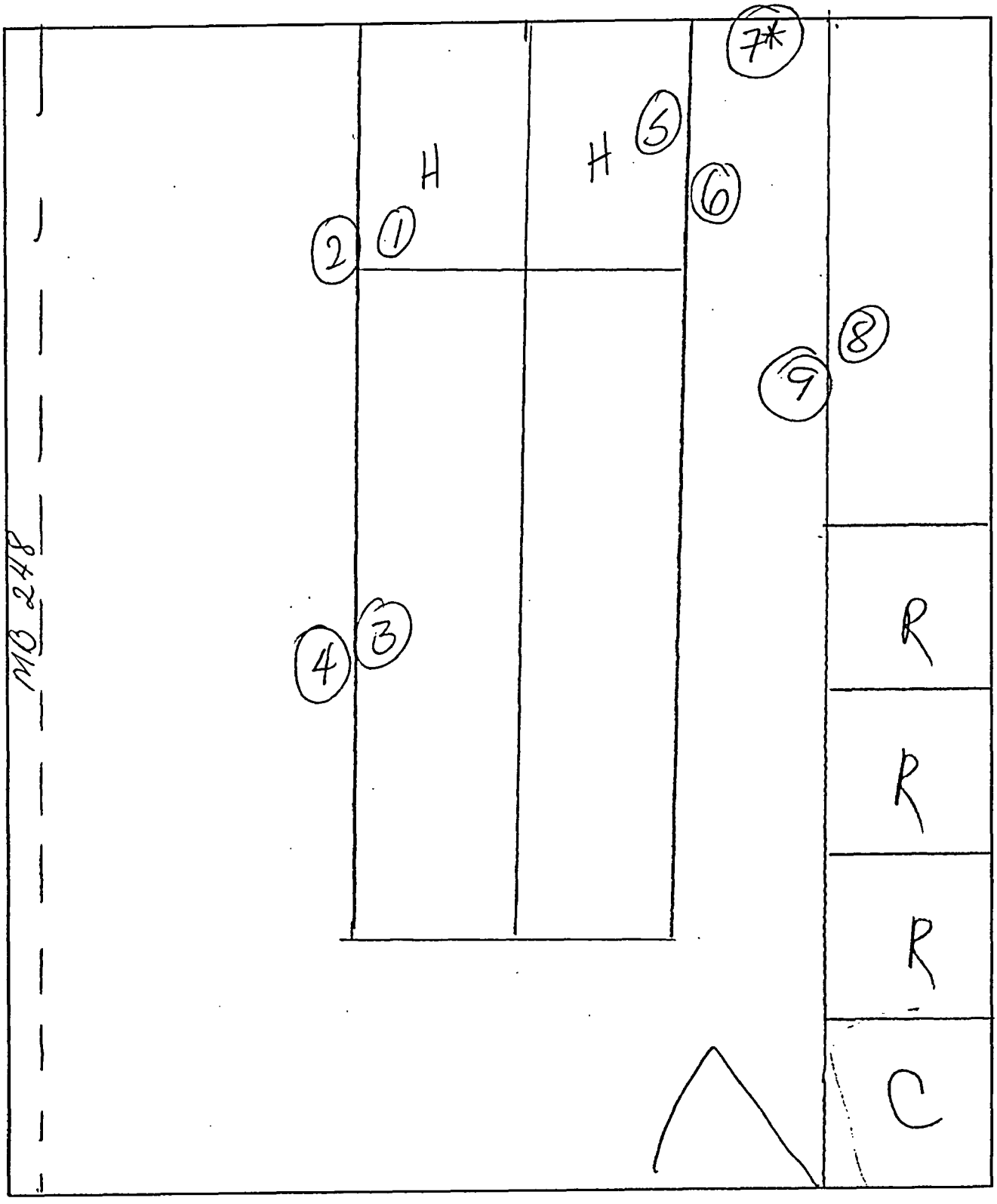
11-18-04
DATE

NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY MAP

LOCATION MB ROOM 250



8/18
250

REMOVABLE CONTAMINATION LEVELS (SMEARS)*

DAN Tullo — *Surveyor*

check of Hood in RM 250 before it's removed. (V. Johnson Area) — *Purpose of Survey*

9/2/81 — *Date*

	1	2	3	4	5	6	7	8
Location	BKG	Gross β cpm w/ ^3H	Net β cpm w/ ^3H	Gross β cpm w/o ^3H	Net β cpm w/o ^3H	Net β μCi w/o ^3H	Net ^3H cpm	Net ^3H μCi
Hood sill	12.8	13.6						
Glass front (outside)	12.8	10.1						
Glass front (inside)	12.8	10.1						
Hood inside (bottom)	12.8	12.6						
Hood inside (Rear wall)	12.8	9.8						
Hood inside (left wall)	12.8	7.0						
Hood inside (Right wall)	12.8	10.6						
Storage cabinets under Hood. (Door)	12.8	5.0						
Storage cabinets under Hood (Bottom)	12.8	11.8						
Refrig.	12.8	14.6.						

* No smearing efficiency value is factored into these results.

Instrument used: _____

$LLD_{(95\%)}$ = _____ cpm

$LLD_{(\beta\ w/o\ ^3H)}$ in μCi = _____ μCi

$LLD_{(^3H)}$ in μCi = _____ μCi

USE REVERSE SIDE FOR CALCULATIONS

OGRAM #: 6
EGION A: LL-UL= 0- 12 LCR= 0 BKG= 0 % 2 SIGMA= 1.0
EGION B: LL-UL= 12- 156 LCR= 0 BKG= 0 % 2 SIGMA= 1.0
ME= 100.00 QIP= SIE/AEC SCR= B/A K= 1.000

Tullo Swipes 81-04

S#	TIME	CPMA/K DPM1/K	%DEV	CPMB/K DPM2/K	%DEV	QIP	FLAGS	SCR	MIN	
1	100.00	84	2.18	20	4.42	723.		.243	101	BLANK
		91		0				.000		
2	100.00	72	2.36	20	4.43	649.		.284	203	1 Rm 134, Bench
		79		0				.000		
3	100.00	75	2.30	21	4.36	649.		.280	304	2 Rm 132, hood
		82		0				.000		
4	100.00	55	2.69	20	4.44	535.	1	.367	405	3 Rm 132, sink
		62		0				.000		
5	100.00	72	2.36	20	4.48	639.		.278	506	4 Rm 132, floor
		79		0				.000		
6	100.00	70	2.39	20	4.53	619.		.279	607	5 Rm 130, sink
		77		0				.000		
7	100.00	64	2.50	20	4.46	583.	1	.316	708	6 Rm 130, hood
		70		0				.000		
8	100.00	63	2.51	21	4.39	578.		.328	809	7 Rm 130, floor
		70		0				.000		
9	100.00	52	2.77	19	4.57	528.	1	.366	910	8 Rm 133, Lss
		59		0				.000		
10	100.00	55	2.70	20	4.49	543.	1	.361	1011	9 Rm 133, floor
		61		0				.000		
11	100.00	61	2.57	20	4.51	572.	1	.325	1112	16 Hall outside 133
		67		0				.000		
12	100.00	77	2.28	21	4.41	657.	1	.269	1213	11 Rm 236, Refrig.
		84		0				.000		
13	100.00	68	2.42	26	3.95	606.	1	.376	1314	12 Rm 228, Sm. Refr
		75		0				.000		
14	100.00	63	2.51	21	4.41	595.	1	.325	1415	13 Rm 228, Hood
		70		0				.000		
15	100.00	67	2.45	23	4.19	584.	1	.343	1516	14 Rm 228, Lig. chromy
		73		0				.000		
16	100.00	61	2.56	25	3.96	564.		.417	1617	15 Rm 250 hood
		67		0				.000		
17	100.00	75	2.30	21	4.35	620.		.280	1718	16 Rm 190 Bench
		83		0				.000		
18	100.00	38	3.23	17	4.81	600.	1	.450	1819	17 Rm 190 Floor
		42		0				.000		

Don Tibbs 7/6/81

25
13

DAN TULLO

```
M #:    6
A:      LL-UL=     0-  12  LCR=     0  BKG=     0  % 2 SIGMA=  1.0
B:      LL-UL=    12- 156  LCR=     0  BKG=     0  % 2 SIGMA=  1.0
100.00  QIP= SIE/AEC SCR= B/A   K= 1.000
```

81-03

#	TIME	CPMA/K DPM1/K	%DEV	CPMB/K DPM2/K	%DEV	QIP	FLAGS	SCR	MIN	
1	100.00	100	2.00	21	4.37	779.		.209	114	BKG
		108		0				.000		
2	100.00	98	2.02	19	4.64	750.		.188	215	Rm 133 LSS.
		106		0				.000		
3	100.00	97	2.04	20	4.53	722.		.202	316	Rm 133 Doorway
		105		0				.000		
4	100.00	83	2.19	18	4.67	698.		.220	417	134 Microcosm
		91		0				.000		
5	100.00	84	2.18	18	4.66	727.		.220	518	134 Balance Area
		91		0				.000		
6	100.00	84	2.18	18	4.72	716.		.212	619	132 Hood
		91		0				.000		
7	100.00	73	2.34	18	4.74	709.		.244	720	132 Sink
		79		0				.000		
8	100.00	85	2.16	19	4.64	724.		.218	821	130 Balance Area
		92		0				.000		
9	100.00	93	2.07	21	4.41	724.		.220	922	130 sink
		101		0				.000		
10	100.00	95	2.05	19	4.53	746.		.205	1023	Hall 130
		102		0				.000		
11	100.00	75	2.31	17	4.86	775.		.226	1124	Hall 133
		81		0				.000		
12	100.00	96	2.04	19	4.55	763.		.202	1225	236 Hood (left)
		103		0				.000		
13	100.00	75	2.31	17	4.83	748.		.230	1326	236 Hood (light)
		81		0				.000		
14	100.00	92	2.09	19	4.64	733.		.202	1427	236 Sink (cent.
		99		0				.000		
15	100.00	95	2.06	19	4.64	788.		.197	1528	LSS center room
		102		0				.000		
16	100.00	72	2.35	17	4.87	757.		.234	1629	Floor center room
		78		0				.000		
17	100.00	43	3.06	14	5.31	752.		.333	1730	228 Hood & Refrig
		46		0				.000		
18	100.00	40	3.17	14	5.31	728.		.357	1831	228 Hood left
		43		0				.000		
19	100.00	72	2.36	17	4.82	721.		.240	1932	228 refrig - sink
		77		0				.000		
20	100.00	85	2.17	19	4.54	726.		.229	2033	228 Floor - Sink
		92		0				.000		
21	100.00	20	4.44	13	5.64	762.		.620	2135	236 Hallway
		22		0				.000		
22	100.00	65	2.49	17	4.81	768.		.268	2236	228 Hallway
		70		0				.000		
23	100.00	34	3.44	16	5.06	746.		.463	2337	250 Hood
		36		0				.000		
24	100.00	44	3.00	16	5.01	743.		.359	2438	250 refrig.
		48		0				.000		
25	100.00	62	2.55	16	4.95	766.		.264	2539	246 Balance
		66		0				.000		

AAM 1/15/81

Swipes of Radiation Areas 1/30/81 81-01

.7807	35	20.000	1345	890	BKG.
67.2 2.5		44.5 3.5			
.7193	36	20.000	872	688	Microcosm Rm 134, Floor
43.6 3.5		34.4 4.5			
.7073	37	20.000	734	644	Microcosm Rm 134, Bench
36.7 4.5		32.2 4.5			
.6825	38	20.000	1334	1244	Rm 132, hood
66.7 2.5		62.2 2.5			
.6551	39	20.000	820	650	Rm 132, Floor
41.0 3.5		32.5 4.5			
.6843	40	20.000	878	652	Rm 130, Floor
43.9 3.5		32.6 4.5			
.6373	41	20.000	718	724	Rm 130, Sink
35.9 4.5		36.2 4.5			
.6627	42	20.000	767	650	Rm 250, Floor
38.3 4.5		32.8 4.5			
.6726	43	20.000	711	565	Rm 250, hood
35.5 4.5		28.2 4.5			
.6733	44	20.000	965	720	Rm 236, Floor
48.2 3.5		36.0 4.5			
.7110	45	20.000	752	654	counter room 2nd floor, Floor
37.6 4.5		32.7 4.5			
.6617	46	20.000	966	675	Rm 228, Floor
48.3 3.5		33.7 4.5			
.6572	47	20.000	698	591	Hall outside Rm 236
34.9 4.5		29.5 4.5			
.6180	48	20.000	650	535	Hall outside Rm 133
32.8 4.5		26.7 4.5			

Daniel Sullo N.P.

U.S. Environmental Protection Agency
Western Ecology Division

NRC Radioactive Materials License No. 36-12343-02 Termination and Facility Decommissioning

Date: **November 27, 2004**
Subject: **Room Survey: Main Building 256 Final Contamination Survey.**

Description and Historic Use:

Single lab (220 ft^2). Hydrogen-3 and carbon-14 tracers, and nickel-63 sealed sources. This room was decommissioned as an unrestricted area on March 19, 2002. No isotope use since 2002. There is no record of leakage of any sealed sources used in this area.

Surveys:

Total (fixed + removable) and removable contamination surveys were conducted in MB 256 at the time of restricted use decommissioning. The decommissioning records are enclosed. All points surveyed demonstrated no significant contamination. The chemical fume hood has minor removable tritium contamination (1.91 Bq/100 cm^2). This area meets the contamination criteria for unrestricted use based upon the isotopes used at our facilities. A HVAC duct swipe was made in November 2004 which detected 0.45 Bq/100 cm^2 contamination.

Records for this room clearly demonstrate that contamination surveys were regularly performed, the area was not subject to any significant contamination events, and the room was maintained as a contaminate-free area. We determined it was unnecessary to conduct further contamination surveys in this area given these survey results and the Western Ecology Division's historic management of radioactive material use in this area. Records of the most recent historic surveys (i.e. prior to the final decommissioning surveys) of MB 256 are included in this report.

The survey for total contamination was conducted using a Ludlum Model 3 Survey Meter equipped with a Ludlum Model 44-9, 12-cm^2 thin-window Geiger-Muller pancake detector. Removable contamination was determined using methanol-wetted swipes counted in a Packard 2200 CA dual channel Liquid Scintillation Counter.

DYNAMAC
CORPORATION
Environmental Services

200 South West 35th Street
Corvallis, OR 97333

Telephone: (541) 754-4844
Fax: (541) 754-4818

3/19/02

MEMO

To: Jay Gile, NHEERL RSO
From: Phil Monaco, Dynamac
Date: March 19, 2002

Subject: Decommissioning Survey of MB 256

The Main Building laboratory, room 256, was surveyed for fixed and removable radioactive contamination. Thirty-four spots were surveyed for fixed contamination and 46 wet (methanol) swipes were taken for removable contamination and analyzed for tritium and ^{14}C.

The fixed contamination survey did not reveal any contamination. Two swipes demonstrated activity above the detection limits for either tritium or ^{14}C: one swipe in the hood was contaminated with tritium (2.32 Bq/100 cm^2); the swipe of the sink demonstrated contamination of both tritium and ^{14}C, 1.91 Bq/cm^2 and 1.35 Bq/cm^2 respectively. The tritium swipe was above the action level (>1.6 Bq/100 cm^2). No removable ^{14}C contamination was detected above the action level. The sink was washed, re-swiped, and counted for carbon using a scaler as an indicator of cleaning efficiency and contamination. The carbon levels (dropped to below the detection level). An additional wet swipe of the sink was made for LSC counting. The levels of both tritium and ^{14}C were below the detection limits.

Recommendations:

The sink was fully decontaminated by washing. I suspect the sink contamination was a result of chemiluminescence.

Given the semi-porous nature of the construction material of the hood, cleaning is efficient in removing contamination. Therefore, it should go on record that an area of the hood is permanently contaminated and should be posted and treated as such during future maintenance operations.

Records of these surveys were logged as 02-04 and placed on file in MB 190. If you have any questions, please contact me.

NHEERL-WED

RADIATION AREA SURVEY

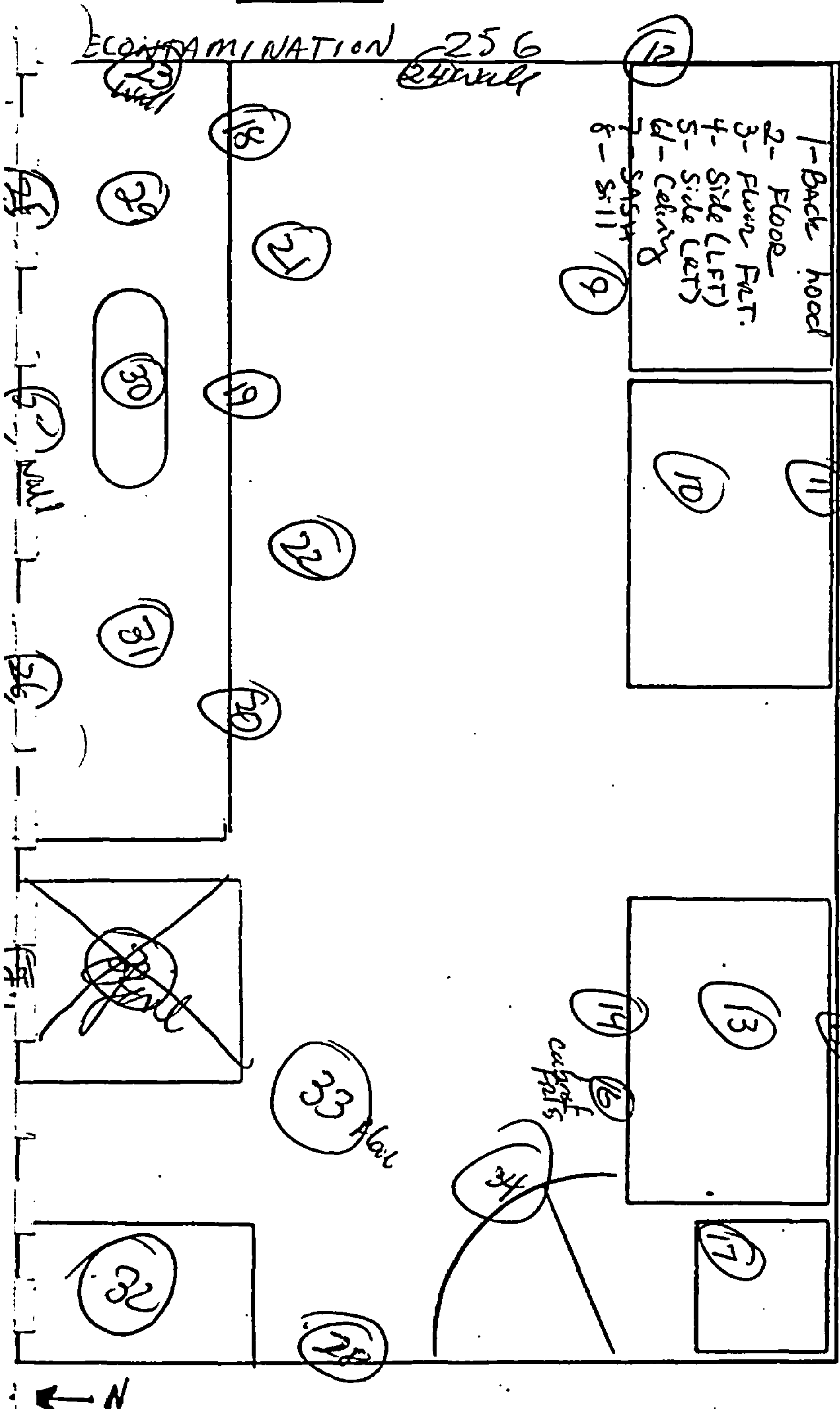
FIXED

LOG NO. 02-04

1/2

DATE 3-8-02

LOCATION MAIN BLDG **ROOM** 256



SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM^2
1	125	<LLD	ND*
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			
27			
28	↓	↓	↓

$LLD_{95} = \left\{\left(\frac{\sqrt{125}}{1}\right) \times 2.96\right\} + = 158$ CPM

BACKGROUND 125 CPM

STANDARD (^{137}Cs, ≈ 1 μCi) 11,000 CPM

INSTRUMENT Ludlum #3

SERIAL NO. 71176

COMMENTS: ND = NOT DETERMINED. Below the Detection Limits

[signature]

RADIATION SPCL.

3-11-02

DATE

NHEERL-WED

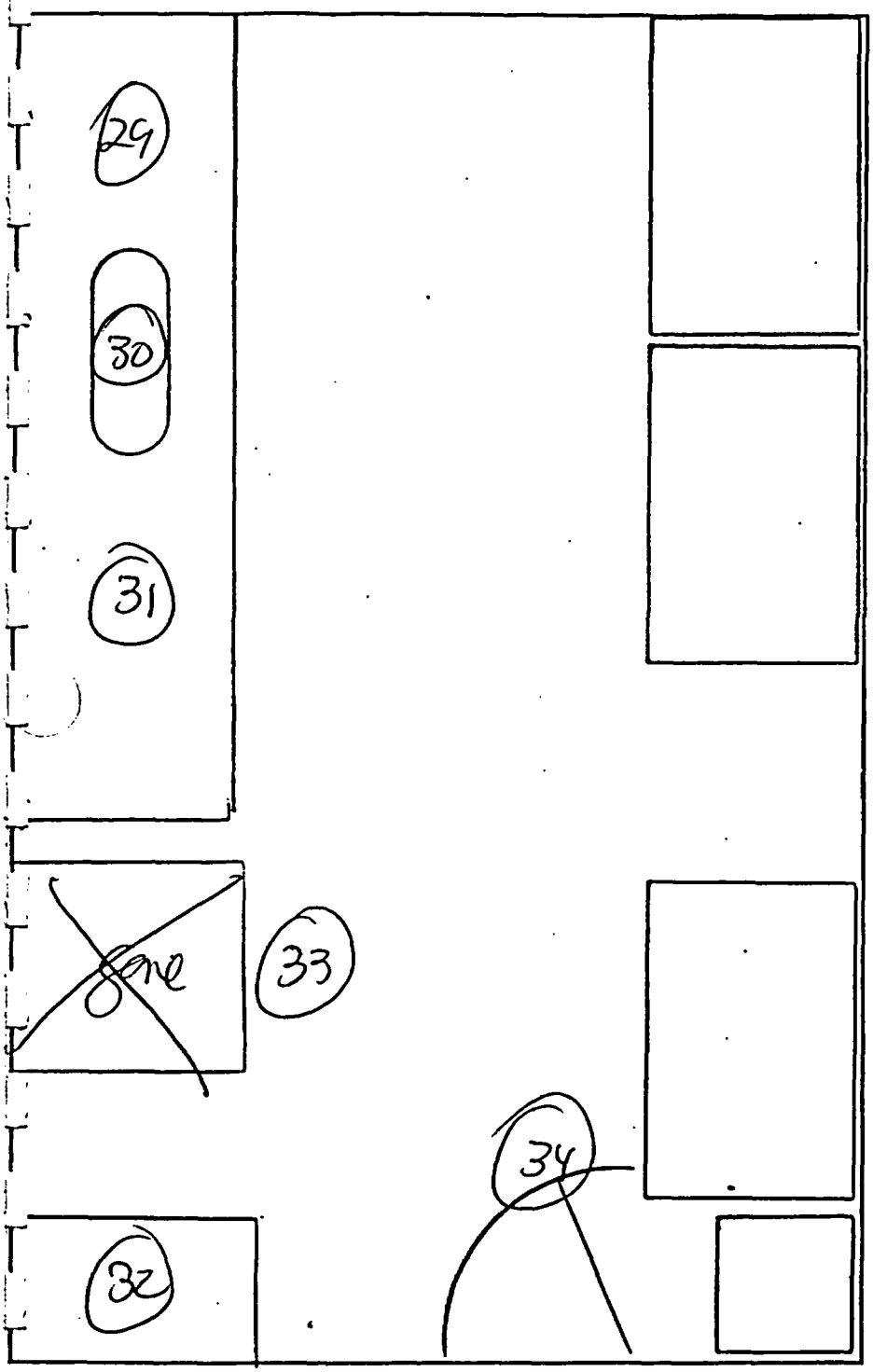
RADIATION AREA SURVEY

LOG NO. 02-2/2

DATE 3-8-02

Fixed

LOCATION MAIN BLDG ROOM 256



SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM^2
29	125	LLD	ND
30			
31			
32			
33			
34			

$LLD_{95} = \{(\sqrt{\quad}) \times 2.96\} + \quad = \quad CPM$

BACKGROUND _____

STANDARD ( ) _____

INSTRUMENT _____

SERIAL NO. _____

N

COMMENTS:

RADIATION SPCL. _____ DATE _____

NHEERL-WED

LOG NO. _____

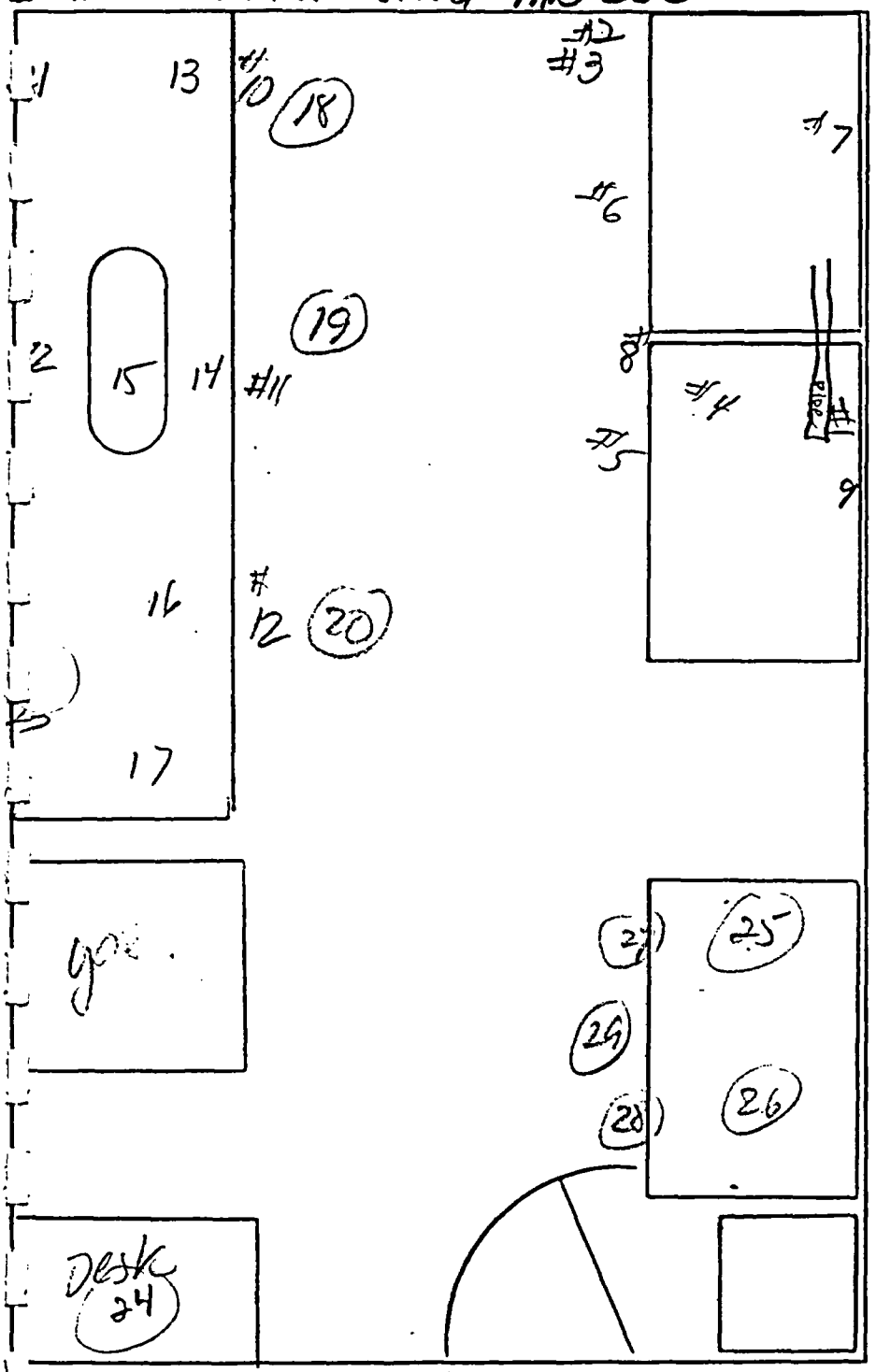
RADIATION AREA SURVEY

REMOVABLE 3H

DATE 3-8-02

LOCATION MAIN BLDG ROOM 256

DECOMMISSIONING MB 256



SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
#1	3	<LLD95	ND*
#2	5		
#3	6		
4	9		
5	4		
6	5		
7	4		
8	3		
9	7		
10	5		
11	5		
12	4		
13	3		
14	2		
15	25	176	1.91 Bq
16	11		
17	5		
18	2		
19	4		
20	7		
21	6		
22	8		
23	4		
24	8		
25	5		
26	4		
27	3		
28	9		
29	6		

upper wall
Lower wall
Lower cabinet
Behind table
Drawers
Floor
upper cab wall
DRAWER FLOOR

$LLD_{95} = \left\{\left(\frac{\sqrt{16}}{2}\right) \times 2.96\right\} + 8 =$ 14 CPM

BACKGROUND 8 CPM

STANDARD (72,853 DPM 3H) 81,611

INSTRUMENT Packard 2200CA

SERIAL NO. 036755

COMMENTS: *ND = NOT DETERMINED. On 3-11-02 Below the detection limits.

RADIATION SPCL.

3-10-02
DATE

NHEERL-WED

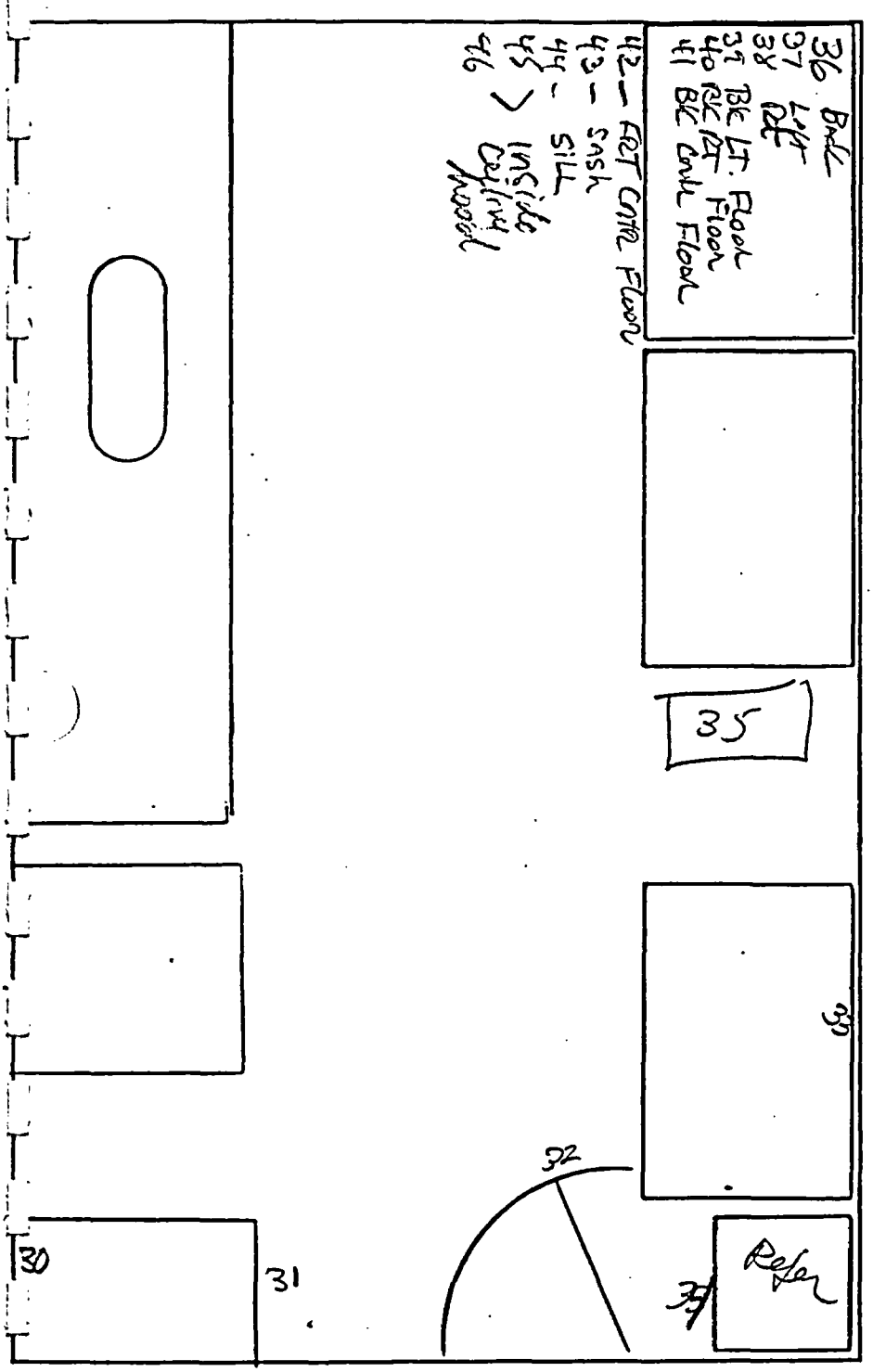
RADIATION AREA SURVEY

REMOVABLE

LOG NO. _____

DATE 3-8-02

LOCATION MAIN BLDG ROOM 256



SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²	
30	2	LLD_{95}	ND	Wall
31	1			Floor
32	2			Door
33	3			Cabs
34	10			
35	10			File
36	20	139	2.32 Bq	
37	4	LLD_{95}	ND	
38	4			
39	5			
40	3			
41	2			
42	5			
43	1			
44	3			
45	6			
46	5			

$LLD_{95} = \{(\sqrt{\quad}) \times 2.96\} + \quad = \quad$ CPM

BACKGROUND _____

STANDARD ( ) _____

INSTRUMENT _____

SERIAL NO. _____

COMMENTS:

RADIATION SPCL. _____ DATE _____

NHEERL-WED

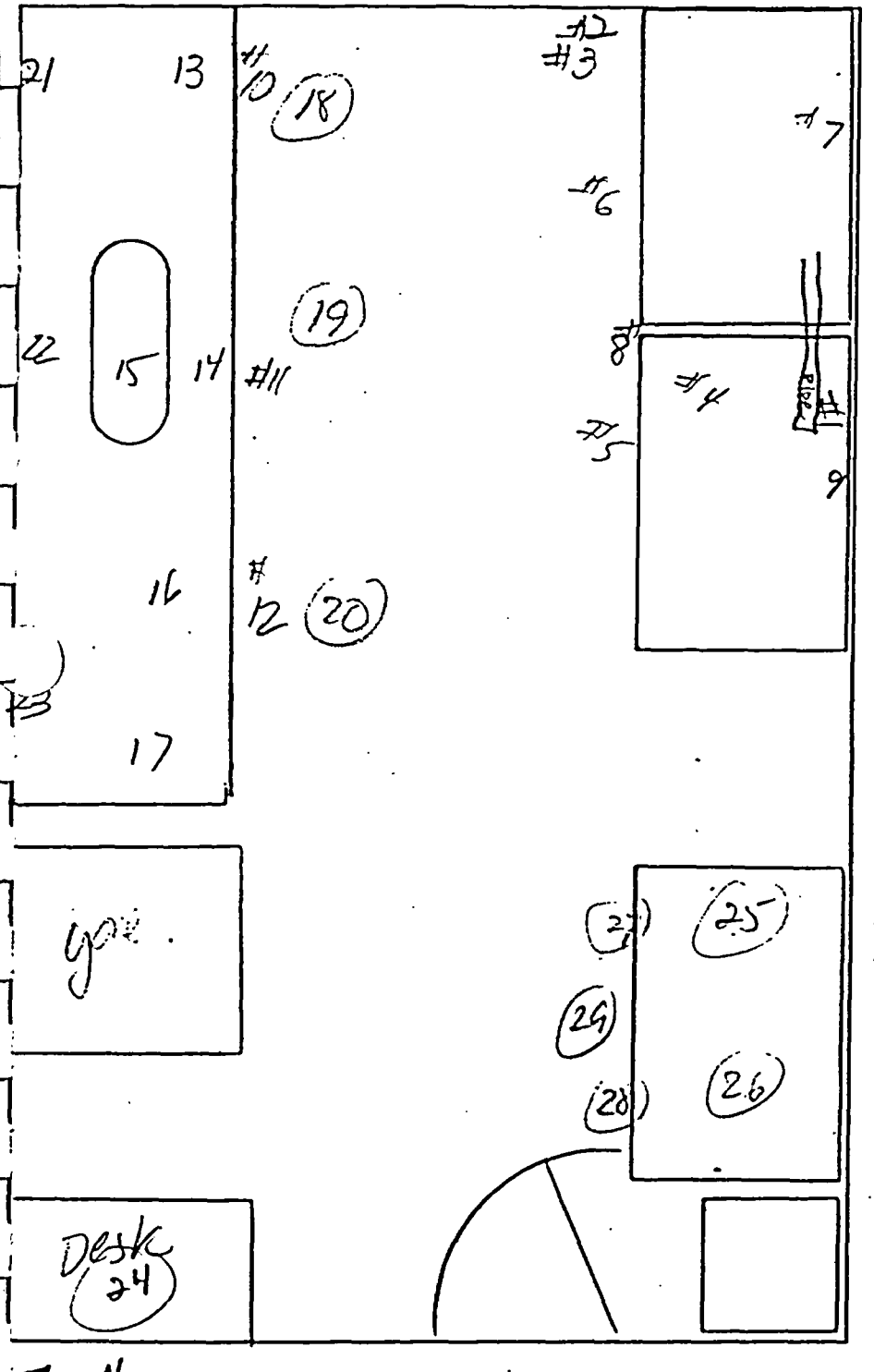
LOG NO. _____

RADIATION AREA SURVEY

REMOVABLE 14C

DATE 3-8-02

LOCATION MAIN BLDG ROOM 256



SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²	
#1	24	LLD95	N/D*	
#2	21			UPPER WALL
#3	18			LOWER WALL
4	22			
5	21			
6	21			
7	25			LOWER CABINET
8	20			
9	15			BENCH TOP
10	18			DRAWER
11	23			
12	23			
13	18			
14	27			
15	85	81	1.35	
16	23	LLD95	ND	
17	23			
18	19			FLOOR
19	17			
20	25			
21	19			UPPER CAB. WALL
22	26			
23	17			
24	24			
25	23			
26	31			
27	23			DRAWER
28	20			FLOOR
29	24			

$LLD_{95} = \left\{ \left(\frac{\sqrt{50}}{2} \right) \times 2.96 \right\} + 25 =$ 36 CPM

BACKGROUND 25 CPM

STANDARD (84,000 dpm ^{14}C) 85052 DPM

INSTRUMENT PACKARD 2200CA

SERIAL NO. 036755

COMMENTS: *ND = NOT DETERMINED. BELOW the Detection Limits.

D.A. Monaco
RADIATION SPCL.

3-11-02
DATE

NHEERL-WED

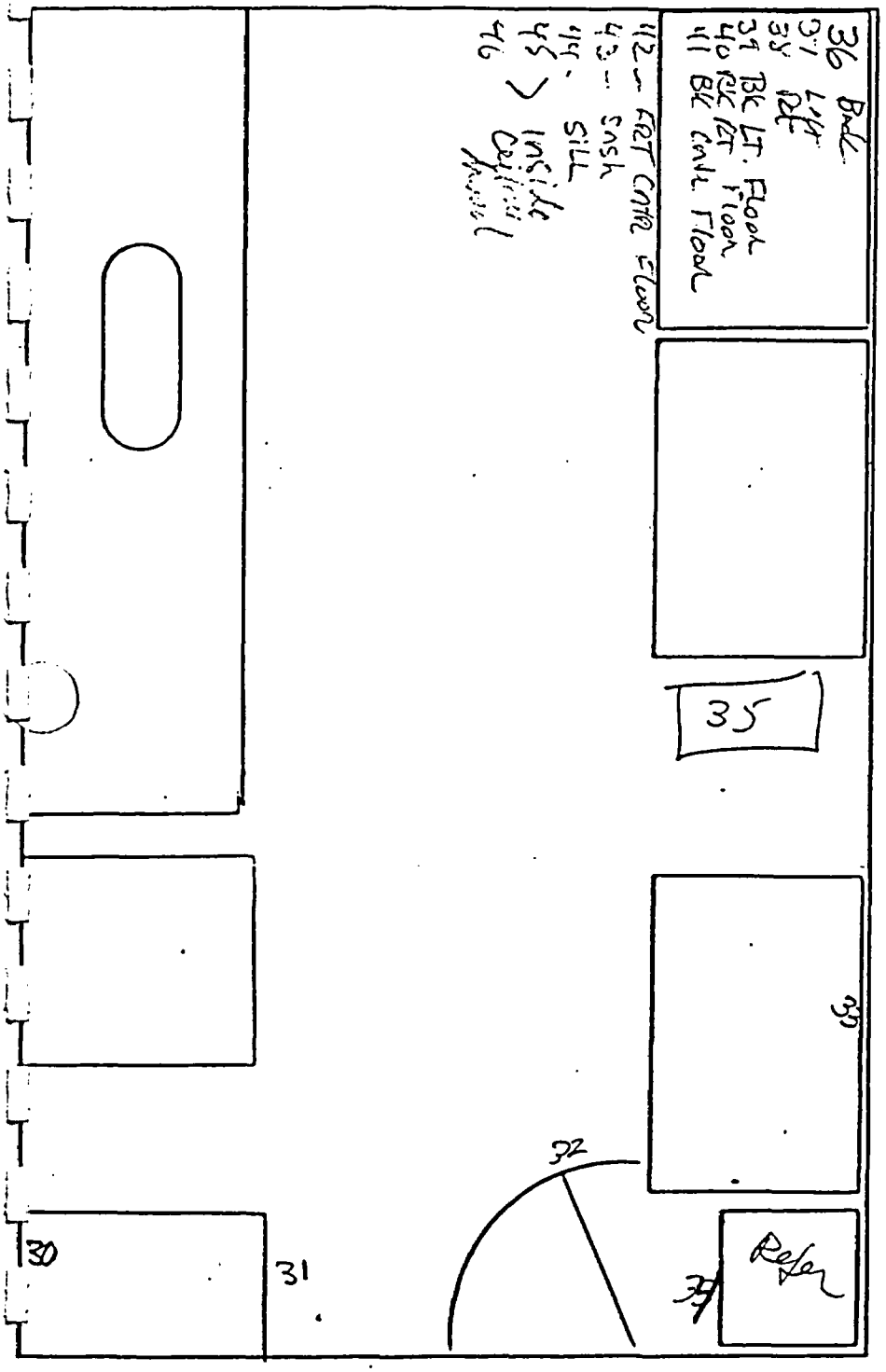
LOG NO. _____

RADIATION AREA SURVEY

REMOVABLE

DATE 3-8-02

LOCATION MAIN BLDG ROOM 256



SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²	
30	21	LLD_{95}	NP*	Wall
31	22			Floor
32	22			Door
33	19			Cabs
34	18			
35	28			Tile
36	17			
37	27			
38	23			
39	25			
40	20			
41	20			
42	20			
43	22			
44	26			
45	20			
46	20			

$LLD_{95} = \{(\sqrt{\quad}) \times 2.96\} + = $ CPM

BACKGROUND _____

STANDARD ( ) _____

INSTRUMENT _____

SERIAL NO. _____

COMMENTS:

_____ RADIATION SPCL.

_____ DATE

NHEERL-WED

RADIATION AREA SURVEY

LOG NO. 02-04

REMOVABLE

DATE 3-18-02 3H LOCATION MB ROOM MB 256

Reswipes Sink

SWIPE #	GROSS ACTIVITY CPM	NET ACTIVITY DPM	Bq/100 CM^2
1	4.5	LLD_{95}	ND*
~~2~~			

$$LLD_{95} = \left\{\left(\frac{\sqrt{11}}{2}\right) \times 2.96\right\} + 10.4 = \text{CPM}$$

BACKGROUND 5.5 CPM

STANDARD (72,853 DPM ^{3}H) 81,835

INSTRUMENT PACKARD 2200 CA

SERIAL NO. # 0367 55

COMMENTS: ND* = NOT DETERMINED. BELOW the Detection Limits.

3-19-02

NHEERL-WED

RADIATION AREA SURVEY

REMOVABLE

LOG NO. 02-04

DATE 3-18-02

^{14}C

LOCATION MB

ROOM MB 256

Resw.pes Sink

Sink

SWIPE #	GROSS ACTIVITY CPM	NET ACTIVITY DPM	Bq/100 CM^2
1	22	LLD_{95}	ND*
2			

$LLD_{95} = \left\{\left(\frac{\sqrt{32}}{2}\right) \times 2.96\right\} + 24 = 24$ CPM

BACKGROUND 16 CPM

STANDARD (^{14}C 84,000dpm) 84,960 DPM

INSTRUMENT Packard 2200CA

SERIAL NO. 0361755

COMMENTS: ND* = NOT DETERMINED. Below the Detection Limits.

3-19-02

Protocol #:30 Name:3H/14C Radsafety ~~04-Jan-80~~ 05:44
Region A: LL-UL= 0.0-12.0 Lcr= 0 Bkg= 0.00 %2 Sigma=0.50
Region B: LL-UL=12.0-156. Lcr= 0 Bkg= 0.00 %2 Sigma=0.50
Region C: LL-UL= 0.0- 0.0 Lcr= 0 Bkg= 0.00 %2 Sigma=0.00
Time = 2.00 QIP = tSIE/AEC ES Terminator = Count
Conventional DPM
Nuclide 1 = 139236 Nuclide 2 = 113700
Luminescence Correction On

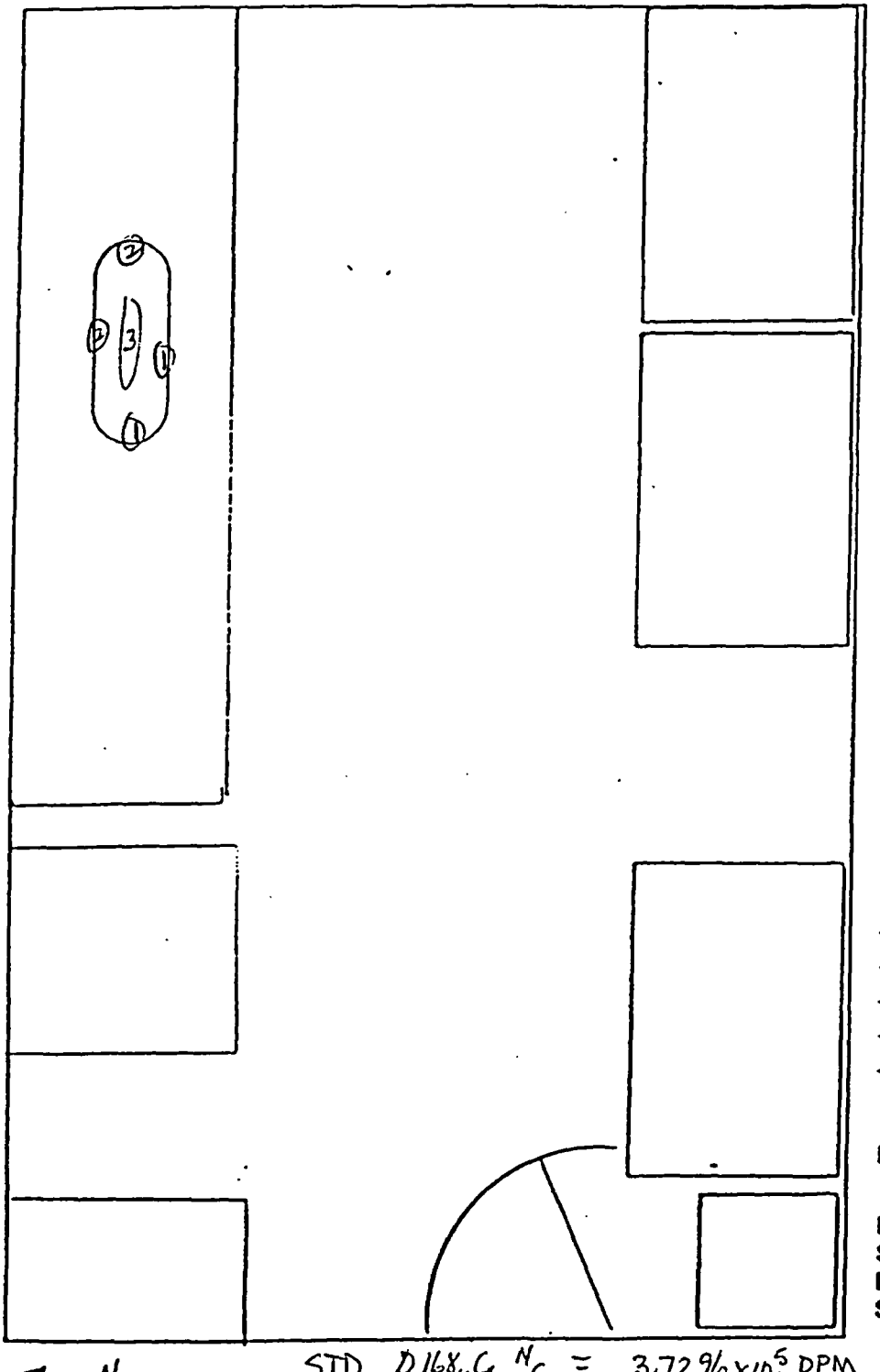
	S#	TIME	CPMA	DPM1	A:2S%	CPMB	DPM2	B:2S%	SIS	tSIE	FLAG	LUM
Bkgnd	1	2.00	5.50	8.09	87.19	11.50	13.16	41.70	124.90	759.		6
3H	2	2.00	38474.5	81835.1	0.72	3868.50	0.00	2.27	15.460	681.		0
14C	3	2.00	9940.00	872.35	1.42	71289.5	84959.9	0.52	129.58	770.		0
(9 missing vials)												
	13	2.00	82.00	111.55	16.36	326.50	392.60	7.82	76.000	456.		0
	14	2.00	587.50	1382.33	5.89	819.50	923.71	4.94	54.520	436.		0
	15	2.00	4748.50	13018.7	2.07	1471.00	1026.20	3.68	22.870	438.		1
	16	2.00	16.50	10.51	39.74	101.50	124.91	14.03	79.200	401.		0
	17	2.00	105.00	0.00	14.44	950.00	1168.10	4.58	85.270	442.		0
	18	2.00	986.50	0.00	4.54	7975.00	9808.78	1.58	82.530	431.		0
	19	2.00	8428.00	0.00	1.55	71006.5	87394.6	0.53	83.020	431.		0
(1 missing vial)												
Bkg	21	2.00	5.50	18.05	83.31	16.00	19.89	35.35	41.180	236.		5
H1	22	2.00	4.50	17.04	96.86	22.00	29.87	30.82	33.520	147.	E	2

NHEERL-WED

LOG NO. 82-04

RADIATION AREA SURVEY

DATE 3-18-02 REMOVABLE Decommission followup sink LOCATION MAIN BLDG ROOM 256



SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
1	28	LLD₉₅	ND*
2	29	↓	↓
3	24	↓	↓

$LLD_{95} = \left\{ \left(\frac{\sqrt{27}}{1} \right) \times 2.96 \right\}$ 42 CPM + = C

BACKGROUND 27 CPM (n=3)

STANDARD (0.168 μCi ^{14}C) 6529 CPM n=3

INSTRUMENT Ludlum Scaler 2000

SERIAL NO. 83810

STD 0.168 μCi $^{14}C \equiv 3.7296 \times 10^5$ DPM ∴ $\frac{6529 \text{ DPM}}{3.7296 \times 10^5 \text{ DPM}} \times 100 = 1.75\%$ eff.

COMMENTS: ND* ≡ Not Determined. Below the Detection Limits.

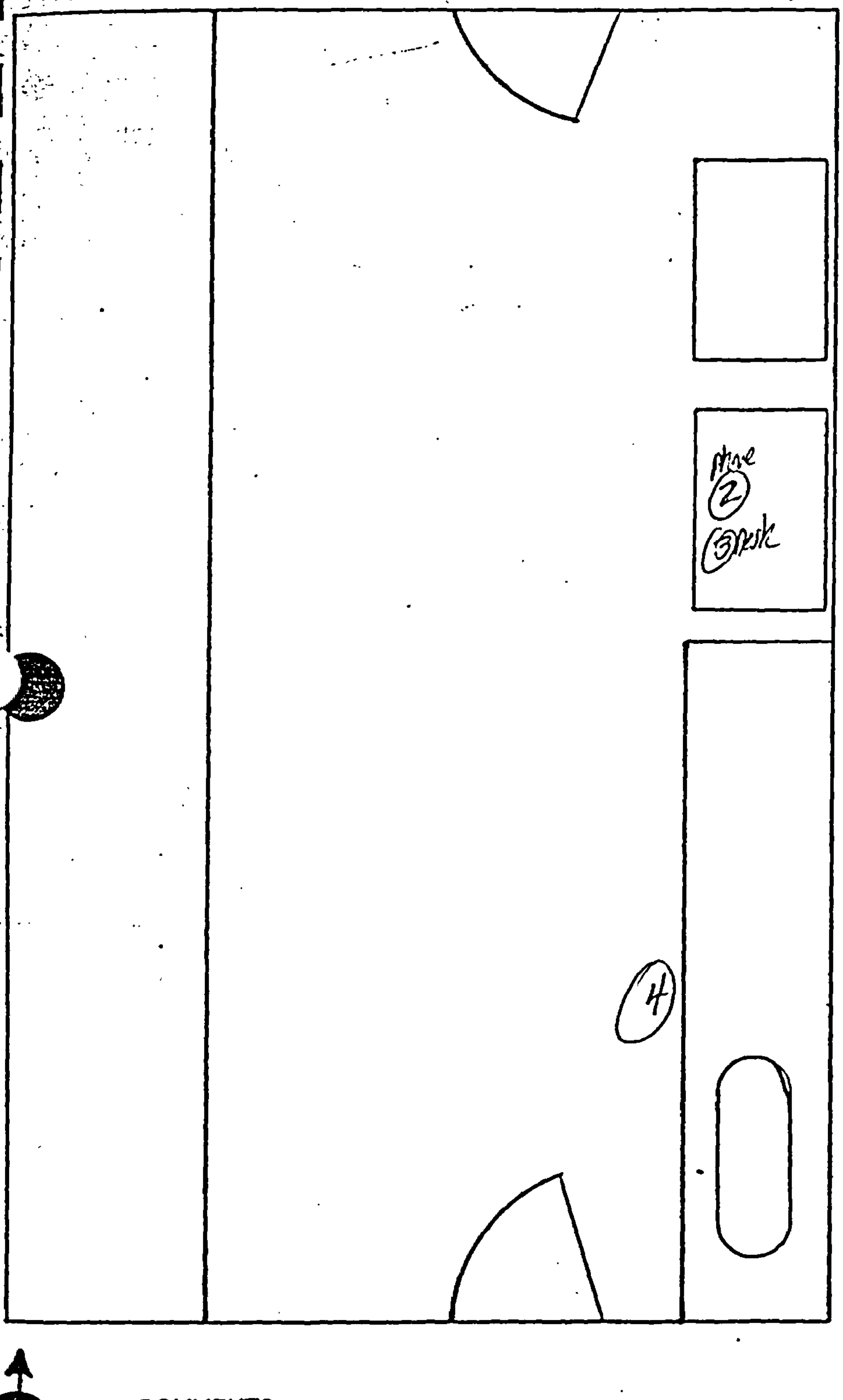
RADIATION SPCL. _____ DATE _____

NHEERL-WED
RADIATION AREA SURVEY

LOG NO. 96-221/4
236

DATE 10/3/96

LOCATION MAIN BLDG ROOM 232B



SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
2	14	44095	∅ net
3	22	"	∅ net
4	29	100	1.7

$$LLD_{95}=\left\{\left(\frac{\sqrt{50}}{2}\right) \times 2.96\right\} + 25 = 36 \text{ CPM}$$

BACKGROUND (#1) 25 CPM
STANDARD (NEW 84200 ...) 85,563
INSTRUMENT PACKARD 2200
SERIAL NO. 036755

COMMENTS:

RADIATION SPCL. [signature]

DATE 10/3/96

NHEERL-WED

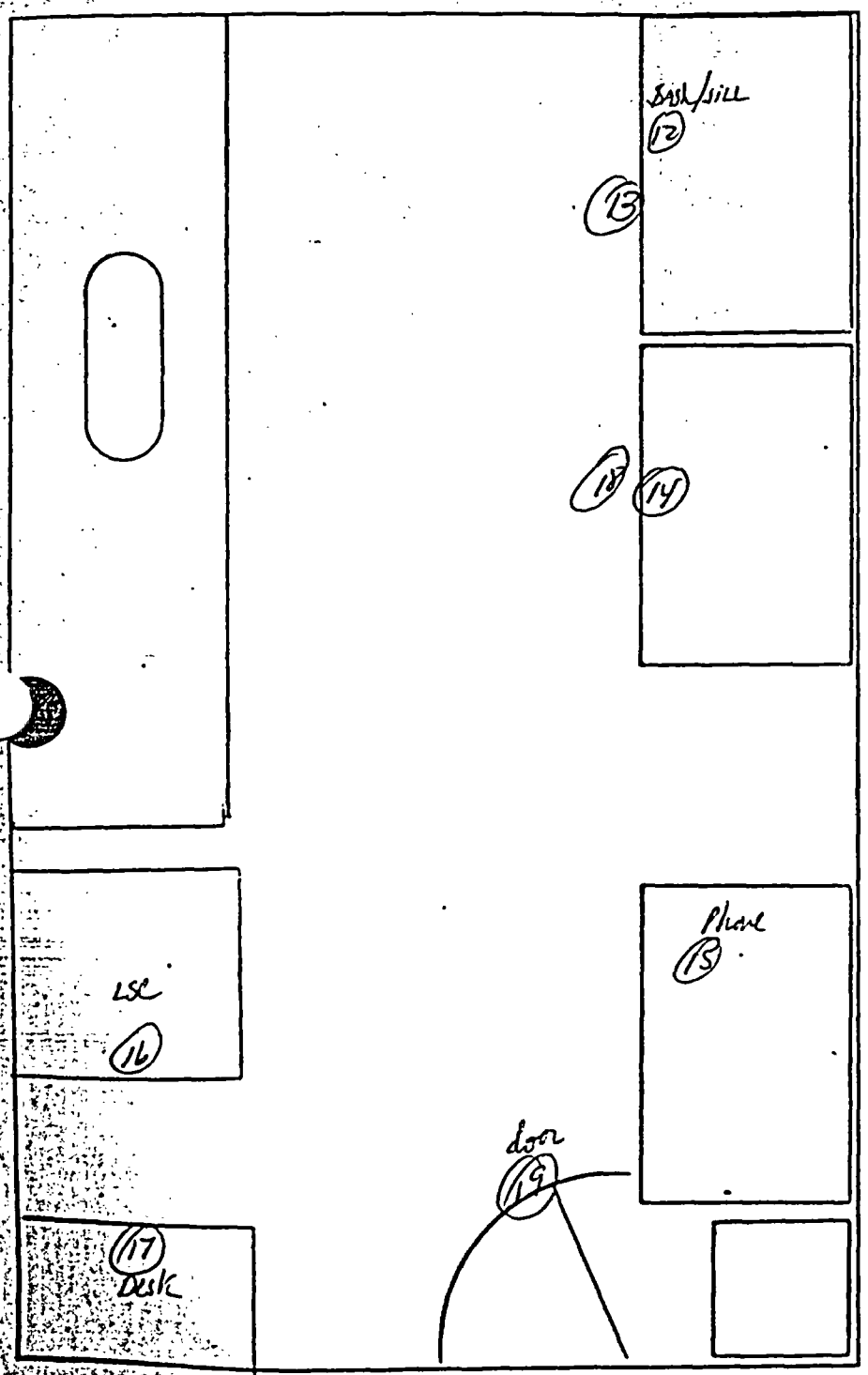
RADIATION AREA SURVEY

LOG NO. 96-22 3/4

256

DATE 10/3/96

LOCATION MAIN BLDG ROOM 256



SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM^2
12	10	LLD_{95}	$\emptyset_{act}$
13	14		
14	3		
15	22		
16	19		
17	20		
18	14		
19	20		

$LLD_{95} = \{(\sqrt{\quad}) \times 2.96\} + \quad =$ CPM

BACKGROUND _____

STANDARD ( ) _____

INSTRUMENT _____

SERIAL NO. _____

COMMENTS:

RADIATION SPCL. _____ DATE _____

U.S. Environmental Protection Agency
Western Ecology Division

NRC Radioactive Materials License No. 36-12343-02 Termination and Facility Decommissioning

Date: **November 27, 2004**
Subject: **Room Survey: Main Building 258 Final Contamination Survey.**

Description and Historic Use:

Double lab (450 ft^2). Hydrogen-3 and carbon-14 tracers, and nickel-63 sealed sources. This room was decommissioned as a unrestricted area on April 27, 1999. No isotope use since 1999. There is no record of leakage of any sealed sources used in this area.

Surveys:

A removable contamination survey was conducted in MB 258 at the time of restricted use decommissioning (1997). The decommissioning records are enclosed. All points surveyed demonstrated no significant contamination. A total contamination survey was conducted in November 2004. All points surveyed (9) demonstrated no contamination. This area meets the contamination criteria for unrestricted use based upon the isotopes used at our facilities. A HVAC duct swipe was made in November 2004 which detected no contamination.

Records for this room clearly demonstrate that contamination surveys were regularly performed, the area was not subject to any significant contamination events, and the room was maintained as a contaminate-free area. We determined it was unnecessary to conduct further contamination surveys in this area given these survey results and the Western Ecology Division's historic management of radioactive material use in this area. Records of the most recent historic surveys (i.e. prior to the final decommissioning surveys) of MB 258 are included in this report.

The survey for total contamination was conducted using a Ludlum Model 2000 Scaler equipped with a Ludlum Model 44-9, 12-cm^2 thin-window Geiger-Muller pancake detector. Removable contamination was determined using methanol-wetted swipes counted in a Packard 2200 CA dual channel Liquid Scintillation Counter.

NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY

FIXED SURVEY

DATE 11-11-04 LOCATION MB ROOM 258

INSTRUMENT Ludlum 2000 Scaler Pancake Probe 44-9

SERIAL NO. 83810 / PR070834

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
1	32	LLD_{95}	ND
2	28		
3	36		
4	26		
5	38		
6	38		
7	42		
8	46		
9	36		

$LLD_{95} = \{(\frac{\sqrt{38}}{0.5}) \times 2.96\}$ % = 113 CPM

BACKGROUND STANDARD (^{14}C 0.16 µCi) 10540 CPM 76 CPM 2.8% eff.

Time 0.5'

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²

$LLD_{95} = \{(\quad) \times 2.96\}$ + = CPM

BACKGROUND STANDARD ( )

COMMENTS:

J. Monaco
RADIATION SPCL.

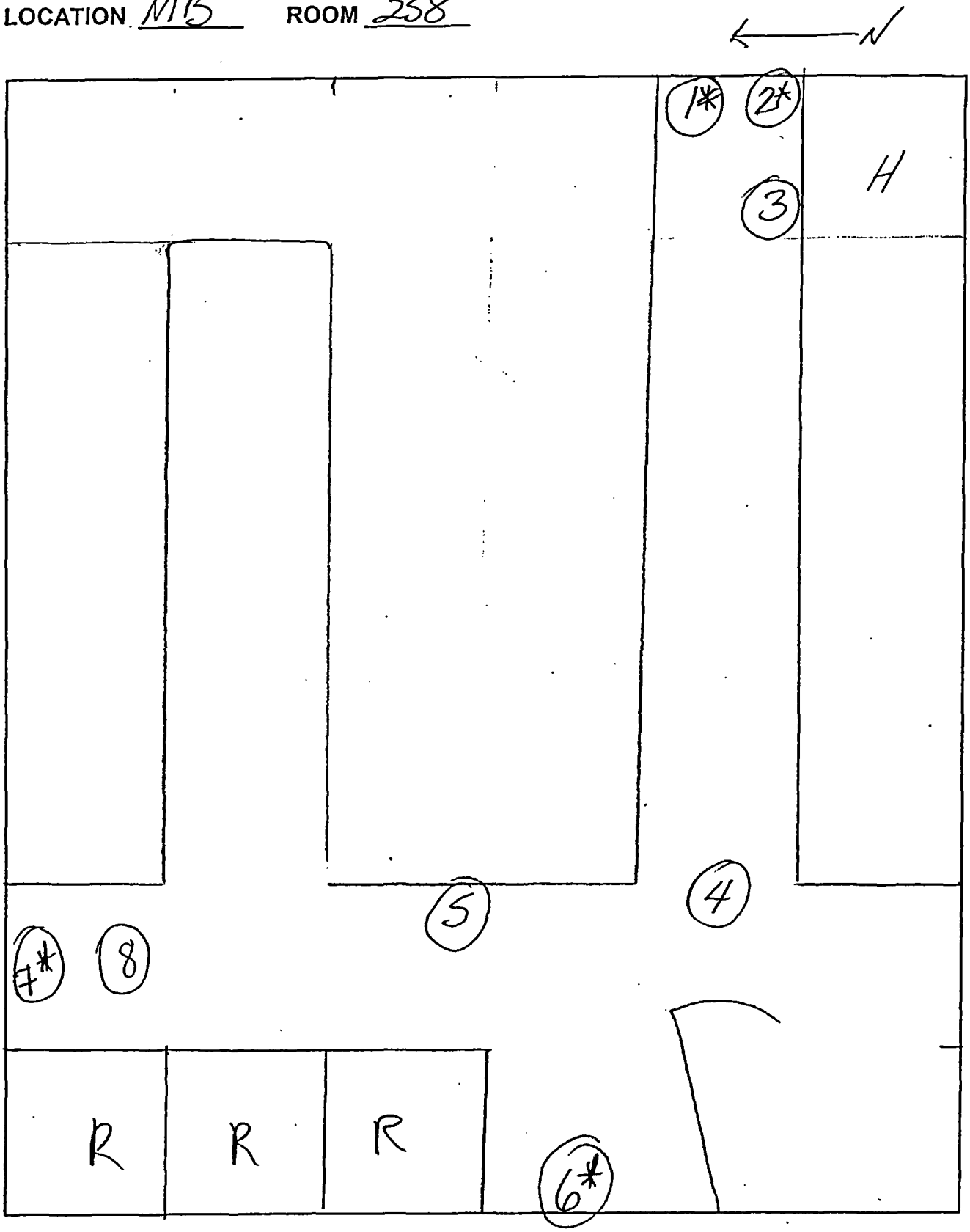
11-16-04
DATE

NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY MAP

LOCATION MB ROOM 258



Memo

To: File
From: Phil Monaco
Date: April 27, 1999

Subject: 258 Decommissioning Swipes

The record for Main Building 258 decommissioning swipes is attached. Forty-seven wet swipes were counted. Four swipes were above the detection limits. Only one swipes (the west refrigerator) demonstrated contamination above the 1.6 Bq/100 cm^2 action level (2.4 Bq/100 cm^2). The refrigerator was posted.

NHEERL-WED

RADIATION AREA SURVEY

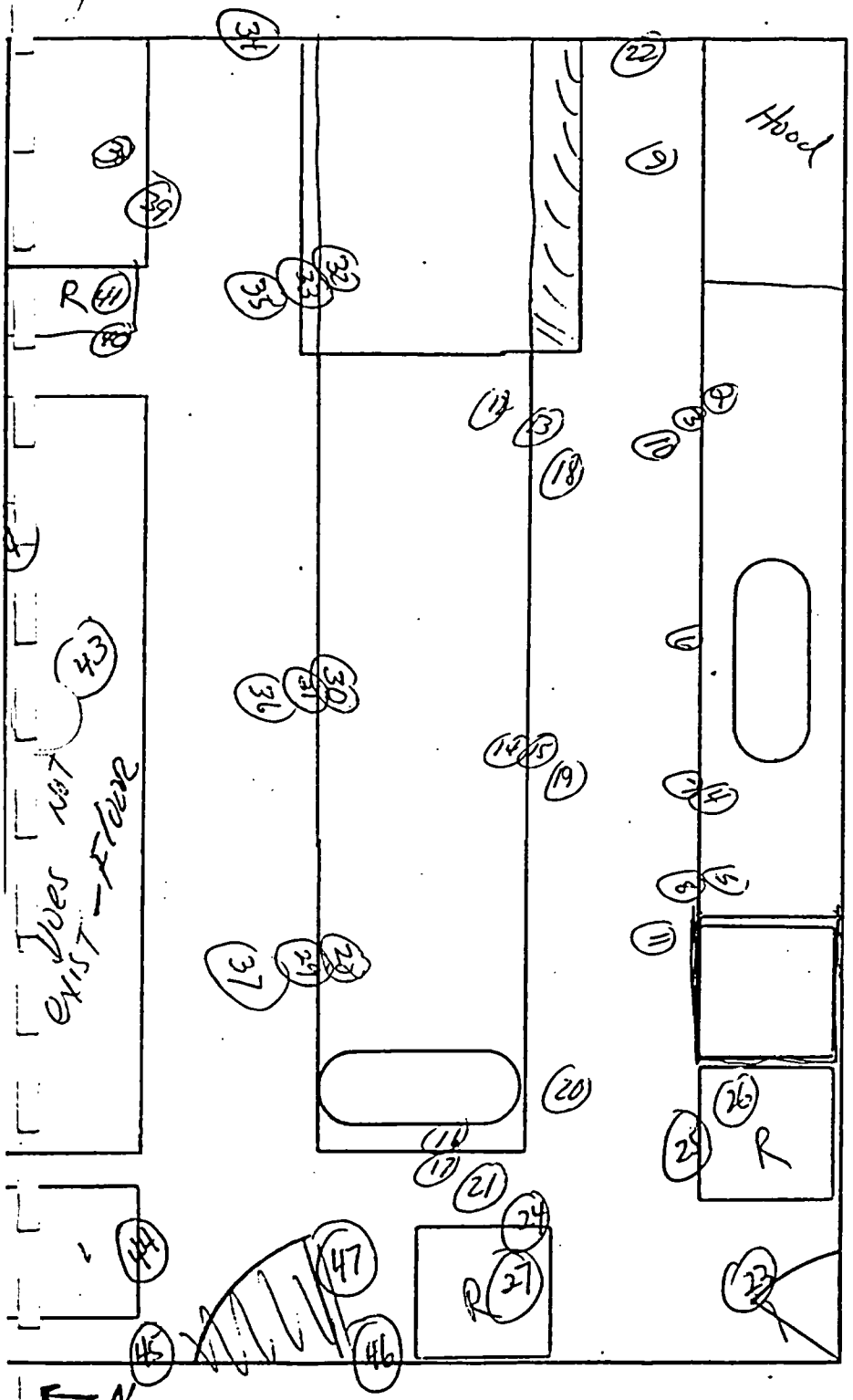
REMOVABLE

LOG NO. 97-1 1/2

DATE 1/6/97

LOCATION MAIN BLDG ROOM ~~236~~ 258 DC

14C



SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
2	16	LLD95	ND
3	27		
4	17		
5	21		
6	25		
7	22		
8	29	~~25~~33	0.5
9	26	LLD95	ND
10	22		
11	21		
12	22		
13	20		
14	21		
15	23		
16	18		
17	23		
18	18		
19	18		
20	26		
21	29	33	0.5
22	22	LLD95	ND
23	21		
24	26		
25	20		
26	30	35	0.6
27	142	183	2.4
28	17	LLD95	ND
29	21		

$LLD_{95} = \{(\sqrt{38}) \times 2.96\} + 19 = 28$ CPM

BACKGROUND 18.5

STANDARD (14C NEN 84800) 86,096

INSTRUMENT PACKARD 2200CA

SERIAL NO. 036755

COMMENTS:

RADIATION SPCL.

DATE

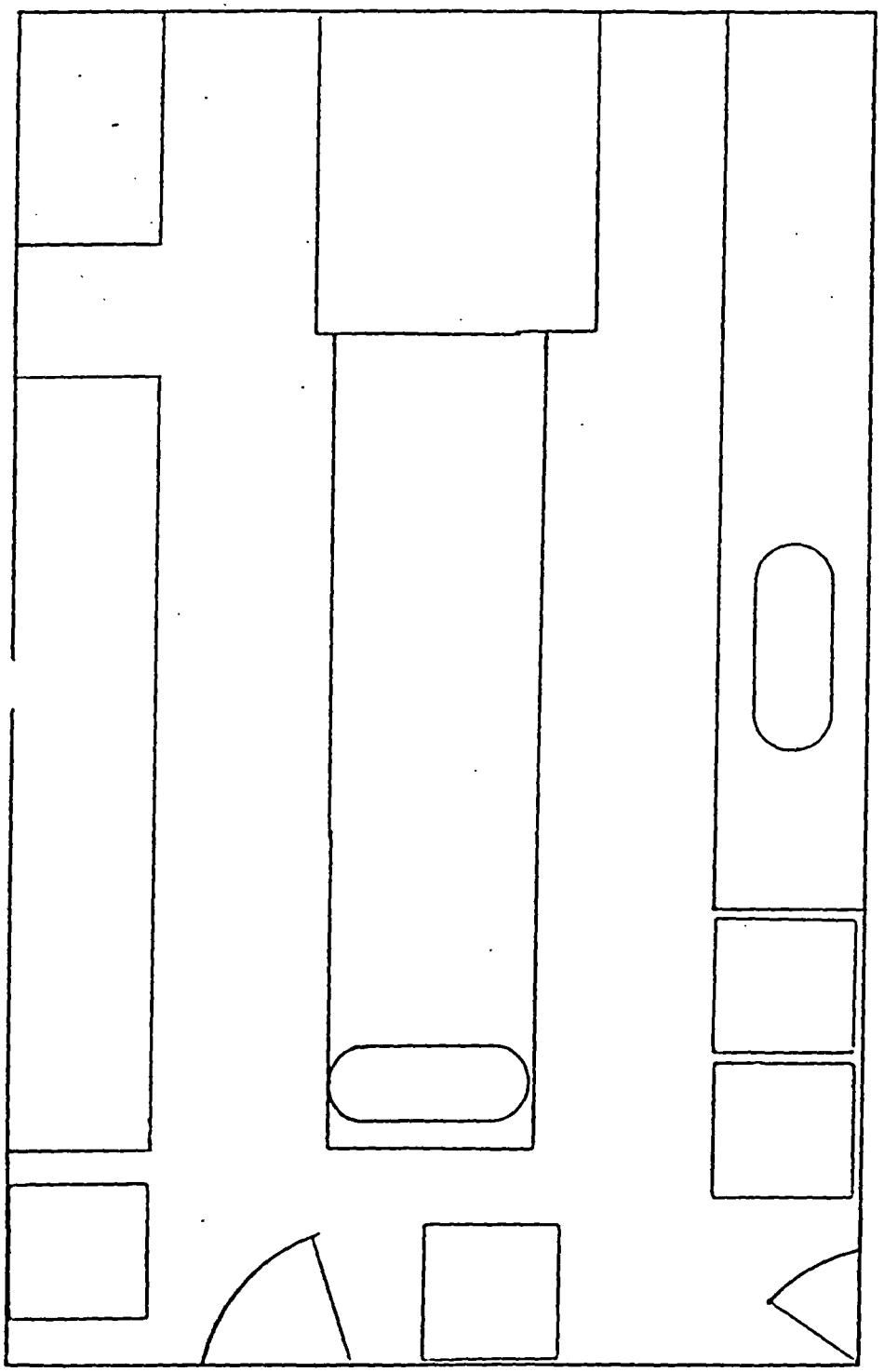
NHEERL-WED

RADIATION AREA SURVEY

LOG NO. 97-1 2/2

DATE 1/6/97

LOCATION MAIN BLDG ROOM ~~256~~ 258



← N

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
30	19	LLD_{95}	NO
31	22		
32	17		
33	22		
34	21		
35	18		
36	20		
37	20		
38	16		
39	26		
40	21		
41	25		
42	22		
43	22		
44	20		
45	15		
46	25		
47	16	↓	↓

$LLD_{95} = \{(\sqrt{\quad}) \times 2.96\} + \quad = \quad$ CF

BACKGROUND _____

STANDARD ( ) _____

INSTRUMENT _____

SERIAL NO. _____

COMMENTS:

RADIATION SPCL: _____ DATE _____

U.S. Environmental Protection Agency
Western Ecology Division

NRC Radioactive Materials License No. 36-12343-02 Termination and Facility Decommissioning

Date: **November 27, 2004**
Subject: **Room Survey: Main Building 262 Final Contamination Survey.**

Description and Historic Use:

Single lab (225 ft^2). Carbon-14 tracer. Samples containing radiotracers were analyzed in this lab one time in 1986. No tracers use since 1986.

Surveys:

Total (fixed + removable) and removable contamination surveys were conducted in MB 262 in November 2004.

All points surveyed (6 total and 6 removable) demonstrated no significant contamination. Four points indicated very low levels of removable contamination from tritium (0.35 – 0.53 Bq/100 cm^2). All other sampling points were at background. This area meets the contamination criteria for unrestricted use based upon the isotopes used at our facilities.

Records for this room clearly demonstrate that contamination surveys were regularly performed, the area was not subject to any significant contamination events, and the room was maintained as a contaminate-free area. We determined it was unnecessary to conduct further contamination surveys in this area given these survey results and the Western Ecology Division's historic management of radioactive material use in this area. Records of the most recent historic surveys (i.e. prior to the final decommissioning surveys) of MB 262 are included in this report.

The survey for total contamination was conducted using a Ludlum Model 2000 Scaler equipped with a Ludlum Model 44-9, 12-cm^2 thin-window Geiger-Muller pancake detector. Removable contamination was determined using methanol-wetted swipes counted in a Packard 2200 CA dual channel Liquid Scintillation Counter.

NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY

FIXED SURVEY

DATE 11-11-04 LOCATION MB ROOM 262

INSTRUMENT Ludlum 2000 Scaler Pancake Probe 44-9

SERIAL NO. 83810 / PR070834

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
1	27	LLD95	ND
2	32		
3	48		
4	38		
5	46		
6	30		

$LLD_{95} = \left\{\left(\frac{\sqrt{38}}{0.5}\right) \times 2.96\right\}\% = 113$ CPM

BACKGROUND STANDARD (^{14}C 0.16 µCi) 76 CPM / 19540 CPM, 2.8% eff.

Time 0.5'

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²

$LLD_{95} = \left\{\left(\text{---}\right) \times 2.96\right\} + =$ CPM

BACKGROUND STANDARD ( ) _____

COMMENTS:

D Monaco 11-16-04

RADIATION SPCL. DATE

NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY

DATE 11-11-04 LOCATION MB ROOM 262

INSTRUMENT Packard LSC 2200 CA

SERIAL NO. 036755

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
1	8	21	0.35
2	4	LLD95	ND
3	11	32	0.53
4	5	LLD95	ND
5	9	30	0.50
6	9	27	0.45

$LLD_{95} = \{(\text{---------}) \times 2.96\} + 7$ CPM

BACKGROUND STANDARD (^3H 64,179 dpm) 4 CPM = 56,056 dpm

87% eff

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
	15	LLD95	ND
	14	↓	↓
	16		
	15		
	12		
	9		

$LLD_{95} = \{(\text{---------}) \times 2.96\} + 30$ CPM

BACKGROUND STANDARD (^{14}C 84,000 dpm) 22 CPM = 85,603 dpm

102% eff

COMMENTS:

RADIATION SPCL.

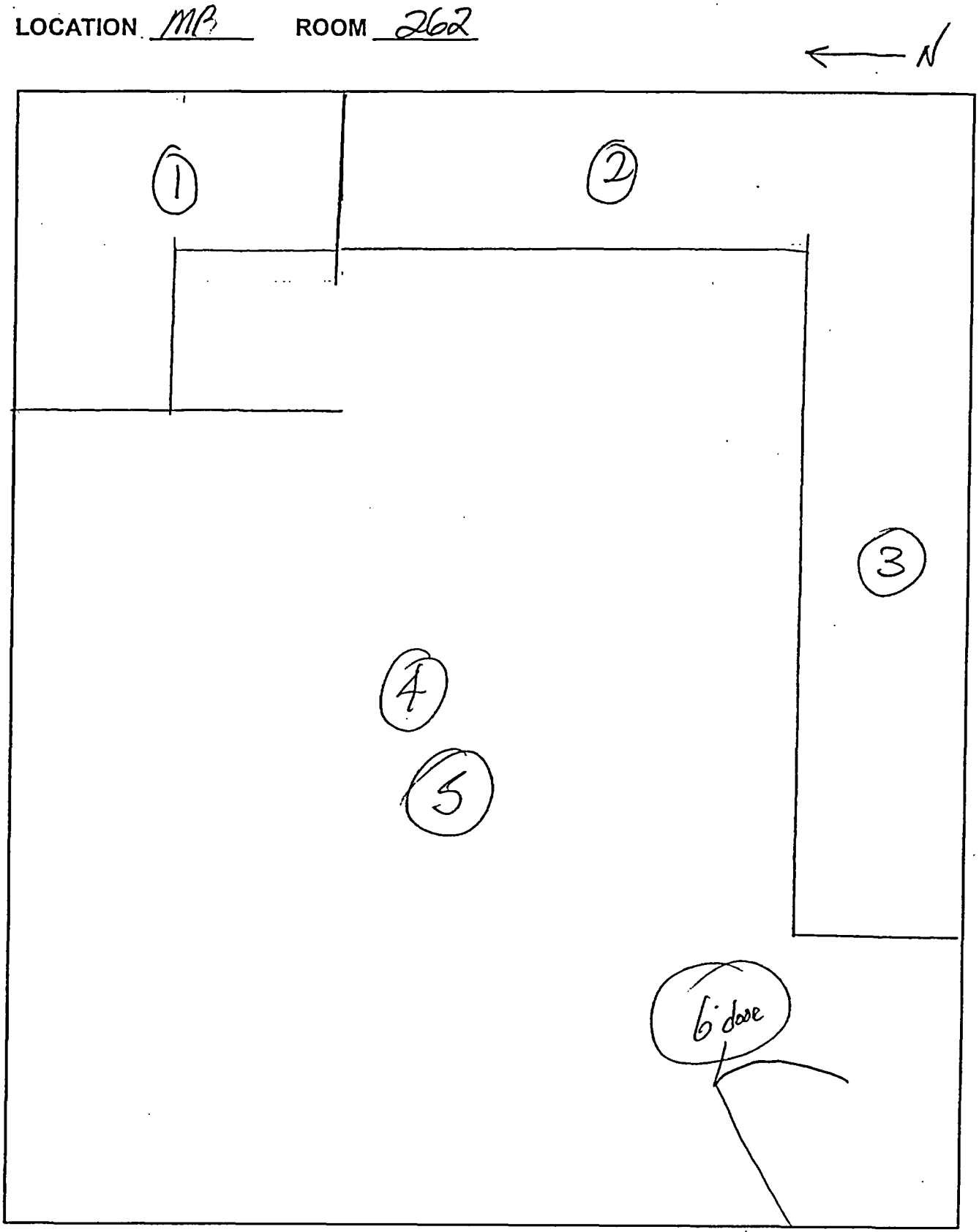
11-18-04
DATE

NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY MAP

LOCATION MB ROOM 262



NORTHROP SERVICES, INC. A Subsidiary of Northrop Corporation
ENVIRONMENTAL SCIENCES

200 Southwest 35th Street
Corvallis, Oregon 97333
Telephone: (503) 757-4664
(FTS-420-4664)

SUBJECT: Post-experiment Radionuclide Swipe Survey Rm 262 DATE: Sept. 15, 1986

FROM: Phil Monaco, Radiation Safety PM.

TO: Jerry Wagner

The following data shows the results of the swipe tests taken in your lab, CERL Room 262. As the figures demonstrate, everything checks out well.

Date	Swipe Location	Net CPM	Net DPM
9/10/86	Instrument work counter	0	
	Floor	1.7	<LLD*
	Room door	0	
9/12/86	Waste Bottle -outside	0	
9/08/86	Waste solution	312.9	345
9/15/86	ICP Stack -inside	2.0	<LLD
8/11/86	ICP Stack -inside (before exp.)	4.1	<LLD

*LLD is defined as the Lower Limits of Detection at the 95% confidence level determined by the background counts.

U.S. Environmental Protection Agency
Western Ecology Division

NRC Radioactive Materials License No. 36-12343-02 Termination and Facility Decommissioning

Date: **November 27, 2004**
Subject: **Room Survey: Main Building 266 Final Contamination Survey.**

Description and Historic Use:

Double lab (450 ft^2). Carbon-14 and phosphorus-32 tracers, and hydrogen-3:scandium and nickel-63 sealed sources. This room was decommissioned as a unrestricted area on April 24, 1996. No isotope use since1993. There is a record of a contamination event due to what may have been a leaking nickel-63 sealed source. However, this was never confirmed. The contaminate isotope may have been tritium. A record of the event and remediation is enclosed.

Surveys:

Total (fixed + removable) and removable contamination surveys were conducted in MB 266 at the time of restricted use decommissioning. The decommissioning records are enclosed. All points surveyed demonstrated no contamination. This area meets the contamination criteria for unrestricted use based upon the isotopes used at our facilities. A HVAC duct swipe was made in November 2004 which detected no contamination.

Records for this room clearly demonstrate that contamination surveys were regularly performed. There was a minor contamination incident of the area thought to be either tritium or nickel-63. The area was thoroughly decontaminated and continually re-swiped and monitored (records enclosed). The laboratory was successfully decontaminated to background levels. Records of the most recent historic surveys (i.e. prior to the final decommissioning surveys) of MB 266 are included in this report.

The survey for total contamination was conducted using a Ludlum Model 3 Survey Meter equipped with a Ludlum Model 44-9, 12-cm^2 thin-window Geiger-Muller pancake detector. Removable contamination was determined using methanol-wetted swipes counted in a Packard 2200 CA dual channel Liquid Scintillation Counter.

DYNAMAC CORPORATION
200 SW 35th Street, Corvallis, OR 97333

MEMORANDUM

TO: Jay Gile, US EPA
FROM: Phil Monaco
DATE: April 24, 1996

SUBJECT: Decommissioning of MB 266

The Biotech/Remediation lab (MB 266) is free of all radioactive materials. Equipment used in the PCP carbon-14 project was decontaminated. The fume hood, hood cabinet, and counters were cleaned, surveyed for removable and fixed radioactive contamination, and determined to be "clean". Given the projected use of MB 266 and its present "clean"state, I recommend that the room be declared "decommissioned" from radioisotope use and designated for non-restricted use from a radiological point of view and all radioactive material signs removed.

The results of the surveys are summarized below.

Fixed Contamination Survey (96-11 and 96-12)
Ludlum #3 S/N 77146 GM

Survey Description	Sample Size	CPM	Activity (pCi/20cm²)
Hood Interior	--	<LLD*	0 net
Hood Exterior	--	<LLD	0 net
Hood Cabinet	--	<LLD	0 net
Floor	5	<LLD	0 net
Wall	1	<LLD	0 net
Counters	10	<LLD	0 net
Cabinet Face	1	<LLD	0 net
Phone	1	<LLD	0 net
Door	1	<LLD	0 net
Sink	2	<LLD	0 net
Appliances	3	<LLD	0 net

*LLD95 = gross cpm Bkgd + (√(CPM Background * Counttime/Count time) * 2.96

125 + √125 * 2.96 = 158 CPM

4/24
I concur. Decommission MB 266
Remove all signs & labels
Jay Gile

Removable Contamination (96-10 and 96-13).
Packard LSC 2000CA S/N 036755

Survey Description	Sample Size	Gross CPM (range)	DPM	Activity (pCi/100cm²)
Hood Interior	8	19-24	<LLD**	0 net
Hood Exterior	2	15-19	<LLD**	0 net
Hood Cabinet	1	20	<LLD***	0 net
Floor	5	17-26	<LLD	0 net
Wall	1	19	<LLD	0 net
Counters	10	15-24	<LLD	0 net
Cabinet Face	1	20	<LLD	0 net
Phone	1	21	<LLD	0 net
Door	1	21	<LLD	0 net
Sink	2	20-21	<LLD	0 net
Appliances	3	19-23	<LLD	0 net

**LLD_{95}=Lower Limits of Detection at the 95% confidence level as calculated by: bkgrd cpm + $(\sqrt{\text{bkgrd cpm} * \text{count time}}/\text{count time})\,2.96$

LLD_{95} $\quad 24\text{ cpm} + \left(\frac{\sqrt{(24\text{ cpm} * 2')}}{2}\right) 2.96 = 24\text{ cpm}$

***LLD_{95}=Lower Limits of Detection at the 95% confidence level as calculated by: bkgrd cpm + $(\sqrt{\text{bkgrd cpm} * \text{count time}}/\text{count time})\,2.96$

LLD_{95} $\quad 18.5\text{cpm} + \left(\frac{\sqrt{(18.5\text{cpm} \times 2')}}{2}\right) 2.96 = 28\text{cpm}$

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
ENVIRONMENTAL RESEARCH LABORATORY
200 S.W. 35TH ST.
CORVALLIS, OREGON 97330

Summary Report of Health Physics' Activity Involving Room 266 Radiation Contamination Incident

6/9 Notified of possible radiation exposure in Room 266 by B. Griffis, F. Stay, and J. Gakstatter, due to abnormally high temperature operation of ^{63}Ni sealed source in Gas Chromatograph (Note: ^{63}NI source will not vaporize until temperature reaches 700°C, informed that operation temperature was 470°C). Conducted preliminary swipe survey of Room 266 (see survey report June 9, 1982) using Gas Flow Proportional Counter (GFPC). Detected significant contamination on floor beside machine.

Conducted a detailed swipe survey of Room 266 (June 9, 1982) using GFPC. Detected significant contamination throughout lab. Contamination levels decrease with increasing distance from gas chromatograph (GC), also detected contamination in hall outside Room 266. Immediately cleaned hall area.

6/10-6/11 Conducted swipe survey of Room 266 using Liquid Scintillation Spectrophotometer (LSS) in Room 133 (June 10, 1982). Began clean-up operation of Room 266. Clean-up consisted of washing all surfaces with "Iso-clean" decontamination agent (Isolab, Inc.) and mopping floor with "Iso-clean" solution. Progress was monitored with a daily swipe survey. Surveyed underneath temporary coverings of lab benches and surveyed notebooks and graph paper located in lab (June

11, 1982). Detected no significant contamination under temporary coverings. Detected significant contamination on surface of papers and notebooks.

Detectable energy levels were varied on the LSS to obtain data on identification of isotope present. Swipes of June 10, 1982 were counted using energy detection levels between 0-200 Kev (Region A) and 20-100 Kev (Region B). (Note: ^{63}Ni E_{max} = 67 Kev, ^{14}C E_{max} 156 Kev, ^{3}H E_{max} 18 Kev.) Activity was detected in Region A, no activity was detected in Region B. Swipes (June 11, 1982) were counted using detection levels between 0-200 Kev (Region A) and 0-19 Kev (Region B) activity was detected in Region A; nearly identical activity was detected in Region B. Swipes (June 11, 1982) were counted using tritium channel: Region A 0-19, Region B 2-19. Region B eliminates chemoluminescence phenomenon. Counts in Region A and Region B are nearly identical.

6/14 Continued clean-up of Room 266. Counted urine samples of Gakstatter and Tullo (June 14, 1982). No detectable activity in urine samples. A. Yartzoff refused to submit urine sample (see memo from J. Gakstatter June 11, 1982). Removed ^{63}Ni detector from GC with help of J. Collins. Detector was sent back to tracor for isotope check and overhaul.

6/15 Completed clean up of lab 266 surfaces. Discussed remaining clean-up procedures with A. Yartzoff.

6/16 Took swipes of manuals removed from 266 to Yartzoff's office and of desk and floor in office (6/16/82). Detected contamination on surface of tracor manual.

6/17 Yartzoff continued clean-up of lab. Took swipes of manuals removed from 266 to Gakstatters office (6/18/82). Manuals are contaminated. Covers were removed and discarded.

6/18 Informed that Yartzoff notified Nuclear Regulatory Commission (NRC) of incident. J. Gakstatter, J. Gile and I gave a verbal report of incident to NRC over telephone. Met with J. McCarty, Yartzoff, Gile, Gakstatter to discuss current data and explore options.

6/21 Ran air monitor in Room 266 for 24 hours, control was set up in Room 190. No activity was detected in air sample (6/22/82). Conducted swipe surveys in various labs throughout CERL to obtain spectrum of background activity in CERL (6/21/82).

6/22 Conducted final swipe survey of Room 266. No activity detected in laboratory. (6/22/82).

DAN Tullo H.P. — Surveyor

Contamination incident Rm 266 — Purpose of Survey

9 June 82 — Date

Preliminary Survey # 3214

82-14

	1	2	3	4	5	6	7	8
Location	BKG	Gross β cpm w/ ^3H	Net β cpm w/ ^3H	Gross β cpm w/o ^3H	Net β cpm w/o ^3H	Net β μCi w/o ^3H	Net ^3H cpm	Net ^3H μCi
Housing ^{63}Ni detector	6.6	10.3	3.7	N/A	N/A	N/A	N/A	N/A
G.C. body (inside)	6.6	8.0	1.4	—	—	—	—	—
G.C. body (outside)	6.6	16.6	10.0					
Wall behind machine	6.6	7.7	1.1					
floor beside machine	6.6	225.1	218.5	*				

no smearing efficiency value is factored into these results.

Instrument used: N.M.C. Gas flow proportional Counter Rm 150

$D_{(95\%)}$ = 3.78 cpm

$4.66 \times \frac{\sqrt{66}}{10}$

$D_{(\beta\ w/o\ ^3H)}$ in μCi = — μCi

$D_{(^3H)}$ in μCi = — μCi

lower limit of detection

USE REVERSE SIDE FOR CALCULATIONS

REMOVABLE CONTAMINATION LEVELS (SMEARS)*

Dan Tullo — *Surveyor*

Rm 266 Contamination incident — *Purpose of Survey*

9 June 82 — *Date*

81-13

	1	2	3	4	5	6	7	8
Location	BKG	Gross β cpm w/ ^3H	Net β cpm w/ ^3H	Gross β cpm w/o ^3H	Net β cpm w/o ^3H	Net β μCi w/o ^3H	Net ^3H cpm	Net ^3H μCi
Wall (Door) (1)	5.6	68.4	62.8					
Wall 5' from Door (2)	5.6	30.4	24.8					
Floor (Door) 5' (3)	5.6	168.4	162.8					
Floor (hood) 5' (4)	5.6	60.1	54.5					
Floor (Desk) (5)	5.0	117.8	112.8					
Floor (hood) (6)	5.0	67.0	62.0					
Floor (sink) (7)	5.0	503.4	498.4					
Bench (sink) (8)	5.6	184.2	178.6					
Bench (9)	5.6	40.3	34.7					
Bench (10)	5.0	164.0	159.0					

* smearing efficiency value is factored into these results.

Instrument used: NMC Gas flow proportional

(95%) = _____ cpm

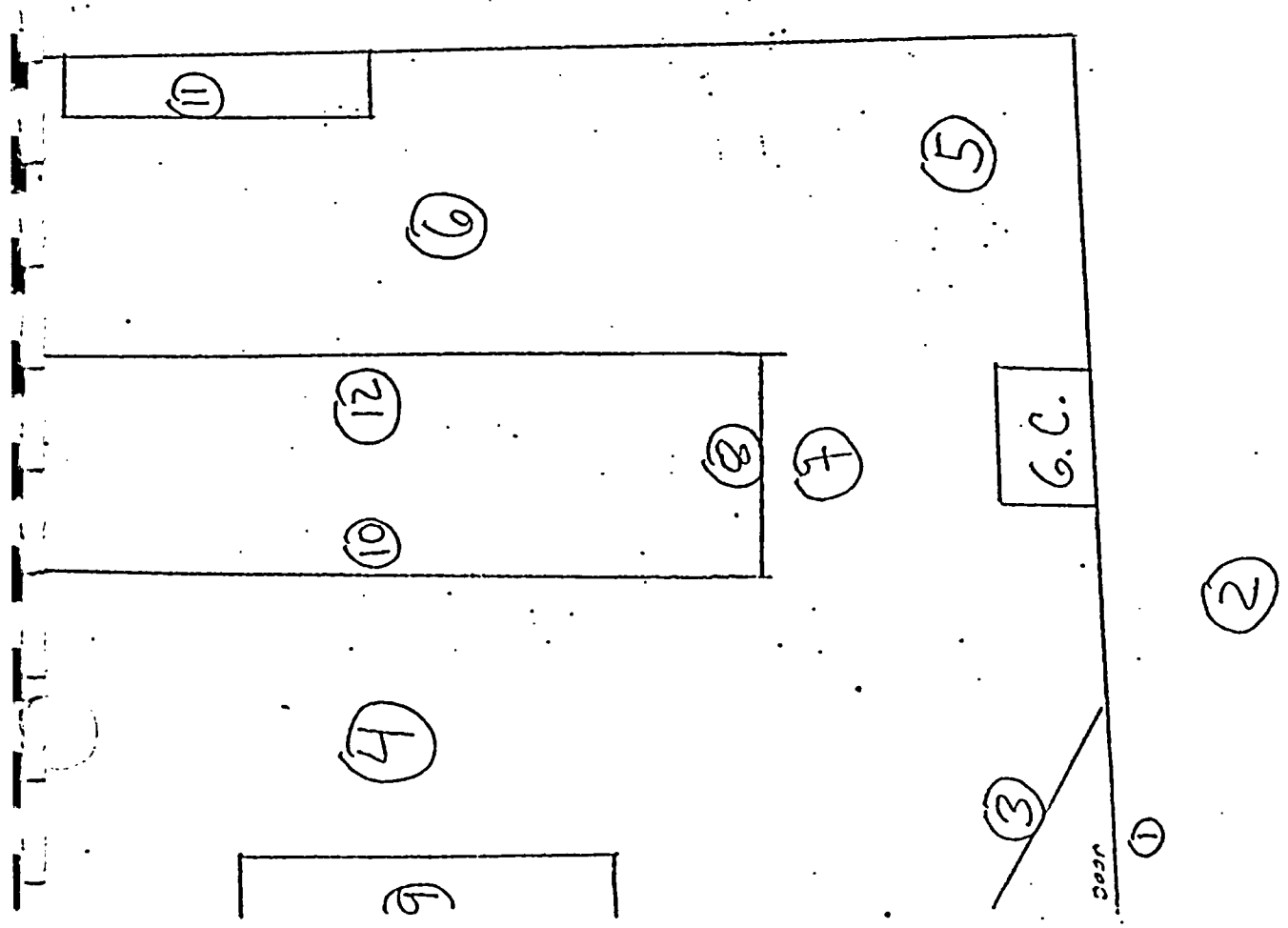
(β w/o ^3H) in μCi = _____ μCi

( ) in μCi = _____ μCi

USE REVERSE SIDE FOR CALCULATIONS

bench | 5.0 | 17.6 | 12.6 |

JUNE 9, 82



counts of swipes of Rm 266
before and After Decontamination
(See Diagram for swipe locations)

June 10 1982

PROGRAM #: 6
REGION A: LL-UL= 0- 200 LCR= 0 BKG= 0 % 2 SIGMA= .2
REGION B: LL-UL= 20- 100 LCR= 0 BKG= 0 % 2 SIGMA= .2
TIME= 30.00 QIP= SIS SCR= B/A K= 1.000

P#	S#	TIME	RegionA CPMA/K	%DEV	RegionB CPMB/K	%DEV	QIP	FLAGS	SCR	MIN	
6	1	30.00	78.73	4.12	8.27	12.7	46.2	?	.105	30	BKG.
6	2	30.00	628.10	1.46	8.33	12.6	17.7	?	.013	61	1
6	3	30.00	571.77	1.53	7.60	13.2	18.1	1?	.013	91	2
6	4	30.00	1148.10	1.08	7.27	13.5	15.0	?	.006	121	3
6	5	30.00	704.20	1.38	7.73	13.1	16.5	?	.011	152	4
6	6	30.00	1738.63	.88	7.87	13.0	14.1	?	.005	182	5
6	7	30.00	765.90	1.32	7.60	13.2	16.0	?	.010	212	6
6	8	30.00	6333.50	.46	7.67	13.1	12.7	?	.001	243	7
6	9	30.00	3619.47	.61	7.77	13.1	13.2	?	.002	273	8
6	10	30.00	325.00	2.03	7.53	13.3	22.0	1?	.023	303	9
6	11	30.00	740.10	1.34	7.47	13.3	16.4	?	.010	334	10
6	12	30.00	198.23	2.59	7.63	13.2	26.0	?	.039	364	11
6	13	30.00	11753.0	.34	7.33	13.4	11.8	1?	.001	394	12
6	14	30.00	84.50	3.97	7.53	13.3	47.0	?	.089	425	1
6	15	30.00	93.10	3.78	7.40	13.4	44.6	?	.079	455	2
6	16	30.00	146.30	3.02 *	8.70	12.3	33.3	?	.059	485	3
6	17	30.00	119.57	3.34 *	8.20	12.7	35.6	?	.069	516	4
6	18	30.00	217.83	2.47 *	7.67	13.1	26.6	?	.035	546	5
6	19	30.00	130.70	3.19 *	7.20	13.6	35.3	?	.055	576	6
6	20	30.00	228.60	2.42 *	7.43	13.3	25.0	?	.033	607	7
6	21	30.00	156.30	2.92 *	8.40	12.6	32.7	?	.054	637	8
6	22	30.00	78.80	4.11	7.33	13.4	46.9	?	.093	667	9
6	23	30.00	126.13	3.25 *	7.53	13.3	35.9	?	.060	698	10
6	24	30.00	58.10	4.79	7.67	13.1	62.4	?	.132	728	11
6	25	30.00	196.70	2.60 *	7.73	13.1	28.1	?	.039	758	12

After Decontam ↓

Still a little high.

Region B NO Activity contamination energy is less than 20 KeV.

Swipe Counts of KM. d&6
Recounted with open channel (Region A) June 11, 1982
And tritium channel (Region B) (see chart for swipe locations)

-UL= 0- 200 LCR= 0 BKG= 0 % 2 SIGMA= .2
L-UL= 0- 19 LCR= 0 BKG= 0 % 2 SIGMA= .2
QIP= SIS SCR= B/A K= 1.000

	CPMA/K (Reg A)	%DEV	CPMB/K (H)	%DEV	QIP	FLAGS	SCR	MIN	
00	58.00	18.5	47.50	20.5	63.0	?	.819	2	BKG
0	583.00	5.86	573.00	5.91	17.2	?	.983	5	1
0	559.00	5.98	546.50	6.05	19.1	?	.978	7	2
.00	1084.50	4.29	1072.50	4.32	14.9	?	.989	10	3
0	665.00	5.48	653.00	5.53	16.1	?	.982	12	4
0	1718.50	3.41	1710.00	3.42	13.5	?	.995	14	5
.00	720.00	5.27	710.00	5.31	14.9	?	.986	16	6
00	6160.00	1.80	6152.00	1.80	12.6	?	.999	19	7
0	3525.50	2.38	3512.50	2.39	13.1	?	.996	21	8
.00	288.00	8.33	274.50	8.54	25.3	?	.953	23	9
0	700.50	5.34	687.50	5.39	18.4	?	.981	25	10
0	202.50	9.94	187.00	10.3	36.0	?	.923	28	11
00	12069.0	1.29	12053.5	1.29	12.1	?	.999	30	12
0	80.50	15.7	69.50	16.9	35.5	?	.863	32	1
0	85.50	15.2	73.00	16.5	52.9	?	.854	34	2
.00	147.50	11.6	130.50	12.3	40.9	?	.885	37	3
	108.00	13.6	99.00	14.2	34.6	?	.917	39	4
	214.50	9.66	204.00	9.90	26.3	?	.951	41	5
.00	124.50	12.6	112.00	13.3	39.0	?	.900	44	6
00	203.50	9.91	193.00	10.1	26.1	?	.948	46	7
.00	141.00	11.9	130.00	12.4	37.1	?	.922	48	8
00	73.50	16.5	63.00	17.8	41.0	?	.857	50	9
00	113.00	13.3	100.00	14.1	38.8	?	.885	53	10
00	50.50	19.9	36.00	23.5	86.2	?	.713	55	11
00	180.50	10.5	172.00	10.7	21.3	?	.953	57	12
00	77.50	16.0	66.00	17.4	49.7	1?	.852	59	under paper (13)
00	72.50	16.6	60.50	18.1	49.1	1?	.834	62	under wood (14)
.00	83.00	15.5	69.00	17.0	55.1	?	.831	64	under paper (15)
00	50.00	20.0	35.00	23.9	88.0	?	.700	66	under cloth (16)
00	124.00	12.7	115.50	13.1	26.6	?	.931	69	Books (17) surface
00	114.00	13.2	98.50	14.2	38.7	?	.864	71	paper surface (18)

Recount of swipes of Rm 266 June 11, 1982
on tritium channel

Region B - eliminates any chemoluminescence phenomenon
counts still nearly identical. - Appears to be tritium.

tritium channel

PROGRAM #: 6
REGION A: LL-UL= 0- 19 LCR= 0 BKG= 0 % 2 SIGMA= .2
REGION B: LL-UL= 2- 19 LCR= 0 BKG= 0 % 2 SIGMA= .2
TIME= 2.00 QIP= SIS SCR= B/A K= 1.000

P#	S#	TIME	CPMA/K	%DEV	CPMB/K	%DEV	QIP	FLAGS	SCR	MIN	
6	1	2.00	57.50	18.6	49.00	20.2	14.5	?	.852	2	BKG
6	2	2.00	608.50	5.73	534.50	6.12	13.2	?	.878	4	1
6	3	2.00	539.50	6.09	475.50	6.49	13.6	?	.881	7	2
6	4	2.00	1122.50	4.22	988.50	4.50	12.8	?	.881	9	3
6	5	2.00	655.00	5.53	564.50	5.95	12.3	?	.862	11	4
6	6	2.00	1724.50	3.41	1493.50	3.66	12.5	?	.866	13	5
6	7	2.00	691.00	5.38	609.50	5.73	13.1	?	.882	16	6
6	8	2.00	6266.00	1.79	5527.50	1.90	12.7	?	.882	18	7
6	9	2.00	3545.00	2.38	3149.50	2.52	13.2	?	.888	20	8
6	10	2.00	298.00	8.19	269.50	8.61	13.5	?	.904	22	9
6	11	2.00	720.00	5.27	626.00	5.65	12.9	?	.869	25	10
6	12	2.00	185.00	10.4	161.50	11.1	13.4	?	.873	27	11
6	13	2.00	12037.5	1.29	10555.0	1.38	12.0	?	.877	29	12
6	14	2.00	64.00	17.6	57.00	18.7	14.7	?	.891	31	1
6	15	2.00	77.00	16.1	69.50	16.9	13.6	?	.903	34	2
6	16	2.00	119.00	12.9	106.50	13.7	14.6	?	.895	36	3
6	17	2.00	98.00	14.2	87.50	15.1	13.8	?	.893	38	4
6	18	2.00	192.00	10.2	170.50	10.8	14.0	?	.888	40	5
6	19	2.00	117.00	13.0	103.00	13.9	14.6	?	.880	42	6
6	20	2.00	224.00	9.45	201.50	9.96	13.9	?	.900	45	7
6	21	2.00	125.00	12.6	107.50	13.6	14.2	?	.860	47	8
6	22	2.00	63.50	17.7	54.50	19.1	15.1	?	.858	49	9
6	23	2.00	123.00	12.7	109.50	13.5	13.6	?	.890	51	10
6	24	2.00	44.00	21.3	39.50	22.5	17.2	?	.898	54	11
6	25	2.00	183.50	10.4	154.00	11.4	17.2	?	.83	5[illegible]	

After Decontam

Bench
Bench
15 under
11
6
4
Books
17
18
PAPERS
under 16
10
12
Door
14
under
13 under
8
Sink
7
Desk
3
5
G.C.
2
June 10 1922.

Swipe Counts

June 14, 1982

8-10

266

6

LL-UL= 0- 200 LCR= 0 BKG= 0 % 2 SIGMA= .2
LL-UL= 2- 19 LCR= 0 BKG= 0 % 2 SIGMA= .2
OIP= SIS SCR= B/A K= 1.000

ME	CPMA/K	%DEV	CPMB/K	%DEV	OIP	FLAGS	SCR	MIN	
30.00	58.27	4.78	37.77	5.94	62.6	?	.648	30	BKG
0.00	93.63	3.77	71.37	4.32	40.7	?	.762	61	1
3.00	91.20	3.82	68.17	4.42	42.9	?	.747	91	2
3.00	79.40	4.10	58.90	4.76	47.3	?	.742	122	3
0.00	132.17	3.18	105.67	3.55	34.9	?	.799	152	4 —
3.00	70.57	4.35	50.43	5.14	51.6	?	.715	182	5
3.00	106.40	3.54	83.63	3.99	39.4	?	.786	212	6 —
0.00	63.10	4.60	43.20	5.56	54.8	?	.685	243	7
3.00	75.80	4.19	57.47	4.82	47.5	?	.758	273	8
3.00	107.93	3.51	85.37	3.95	38.2	?	.791	303	9 —
3.00	55.03	4.92	38.57	5.88	61.6	?	.701	334	10
3.00	55.10	4.92	37.83	5.94	65.2	?	.687	364	11
30.00	92.97	3.79	71.50	4.32	39.8	?	.769	394	12
0.00	80.30	4.07	59.77	4.72	48.6	?	.744	425	13
3.00	56.57	4.85	39.40	5.82	64.1	?	.697	455	14
3.00	107.37	3.52	85.87	3.94	37.4	?	.800	485	15 —
0.00	67.37	4.45	50.23	5.15	51.2	?	.746	516	16
3.00	244.93	2.33	214.27	2.49	26.3	?	.875	546	17 —
3.00	30.13	6.65	17.70	8.68	94.5	?	.587	576	18
30.00	25.90	7.17	12.93	10.1	110.	?	.499	606	19
30	31.63	6.49	16.73	8.93	103.	?	.529	637	20
30.00	27.90	6.91	14.67	9.53	97.8	?	.526	667	21
3.00	29.70	6.70	15.27	9.35	110.	?	.514	698	22
3.00	35.60	6.12	20.80	8.01	89.3	?	.584	728	23
30.00	72.00	4.30	52.73	5.03	46.6	?	.732	758	24
3.00	39.20	5.83	22.03	7.78	92.1	?	.562	788	25
3.00	93.73	3.77	70.03	4.36	54.3	?	.747	819	26
3.00	50.50	5.14	32.27	6.43	73.6	?	.639	849	27
0.00	31.43	6.51	13.97	9.77	118.	?	.444	1183	urine Oakstaden
3.00	40.07	5.77	16.70	8.94	142.	?	.417	1213	urine Tullo

June 14, 1982

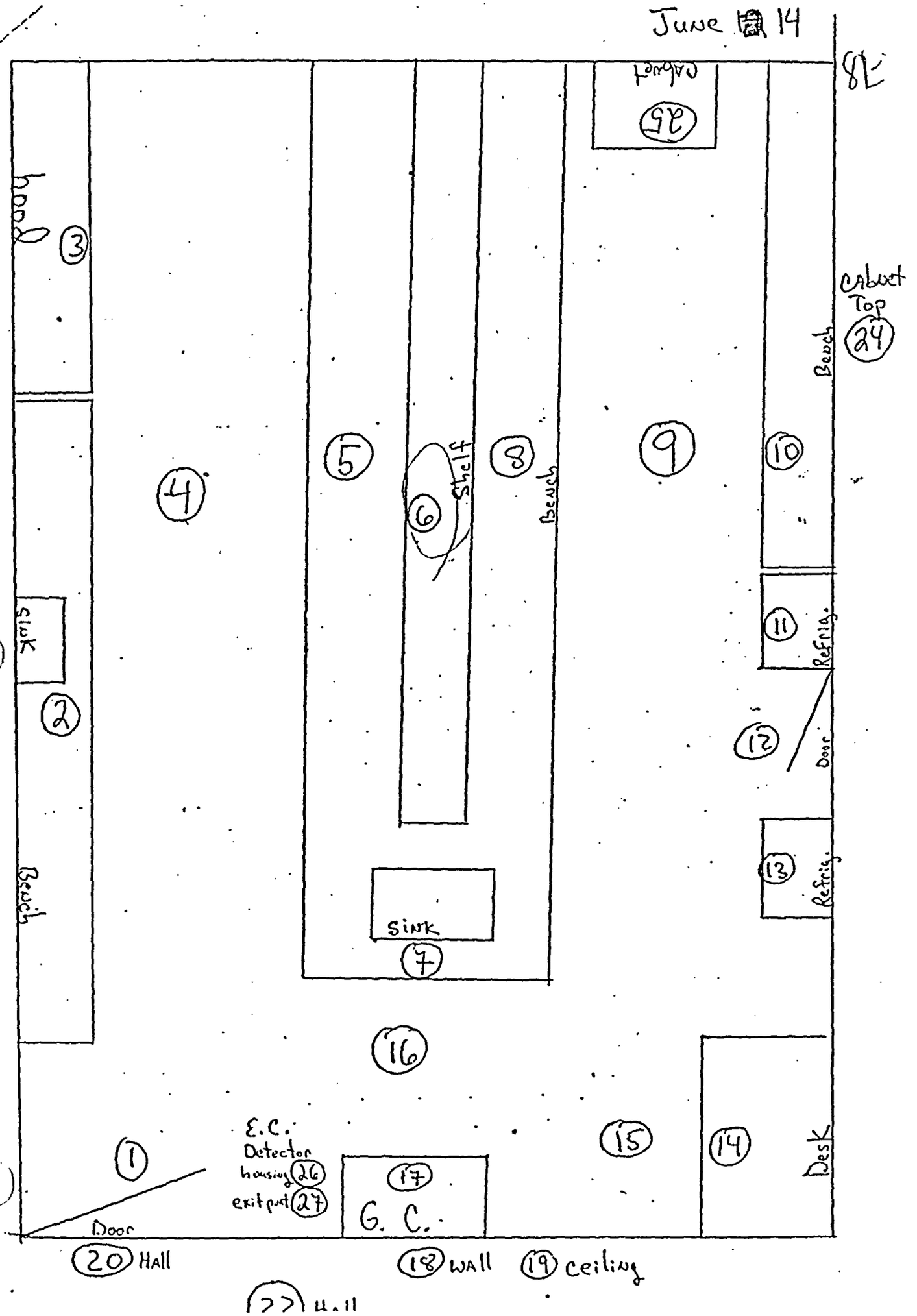
8P10

```
# :     6
A:      LL-UL=     0- 200  LCA=     0  BKG=     0  % 2 SIGMA=    .2
B:      LL-UL=     2-  19  LCB=     0  BKG=     0  % 2 SIGMA=    .2
30.00   QIP= SIS      SCR= B/A    K= 1.000
```

#	TIME	CPMA/K	%DEV	CPMB/K	%DEV	QIP	FLAGS	SCR	MIN	
1	30.00	66.53	4.48	47.17	5.32	53.8	?	.709	30	1
2	30.00	52.53	5.04	34.23	6.24	67.5	?	.652	61	2
3	30.00	66.70	4.47	48.17	5.26	57.1	?	.722	91	3
4	30.00	30.70	6.59	17.27	8.79	94.6	?	.562	122	4 —
5	30.00	441.40	1.74	368.77	1.90	18.2	?	.835	152	5
6	30.00	100.83	3.64	79.97	4.08	42.1	?	.793	182	6 —
7	30.00	106.83	3.53	81.43	4.05	41.9	?	.762	212	7
8	30.00	58.83	4.76	30.23	6.64	60.7	1?	.514	243	8 Asbestos mat'l
9	30.00	88.67	3.88	42.20	5.62	40.2	1?	.476	273	BKG

Swipe 5 of Bench still high - Informed Yantzoff, he will clean it up.

June 14


hood
3
4
5
6
Shelf
8
Bench
9
Cabinet
28
10
Bench
Cabinet Top
24
11
Refrig.
12
Door
13
Refrig.
sink
2
Bench
sink
7
16
15
14
Desk
E.C.
Detector housing 26
exit port 27
1
Door
17
G. C.
20 Hall
18 WALL
19 ceiling

6/16/82

	49	20.000	8259		228	Tracor manual (Top)	
AP	2.9	1.5	10.4	7.5			
	50	20.000	AAP		311	floor in office (yantzoff)	
	22.0	4.5	15.5	7.5			
	51	20.000	553		317	Tracor manual (Bottom)	
	27.6	4.5	15.8	7.5			
	52	20.000	377		352	Desk in office (yantzoff)	
	18.8	7.5	17.0	7.5			

87-9

8-7

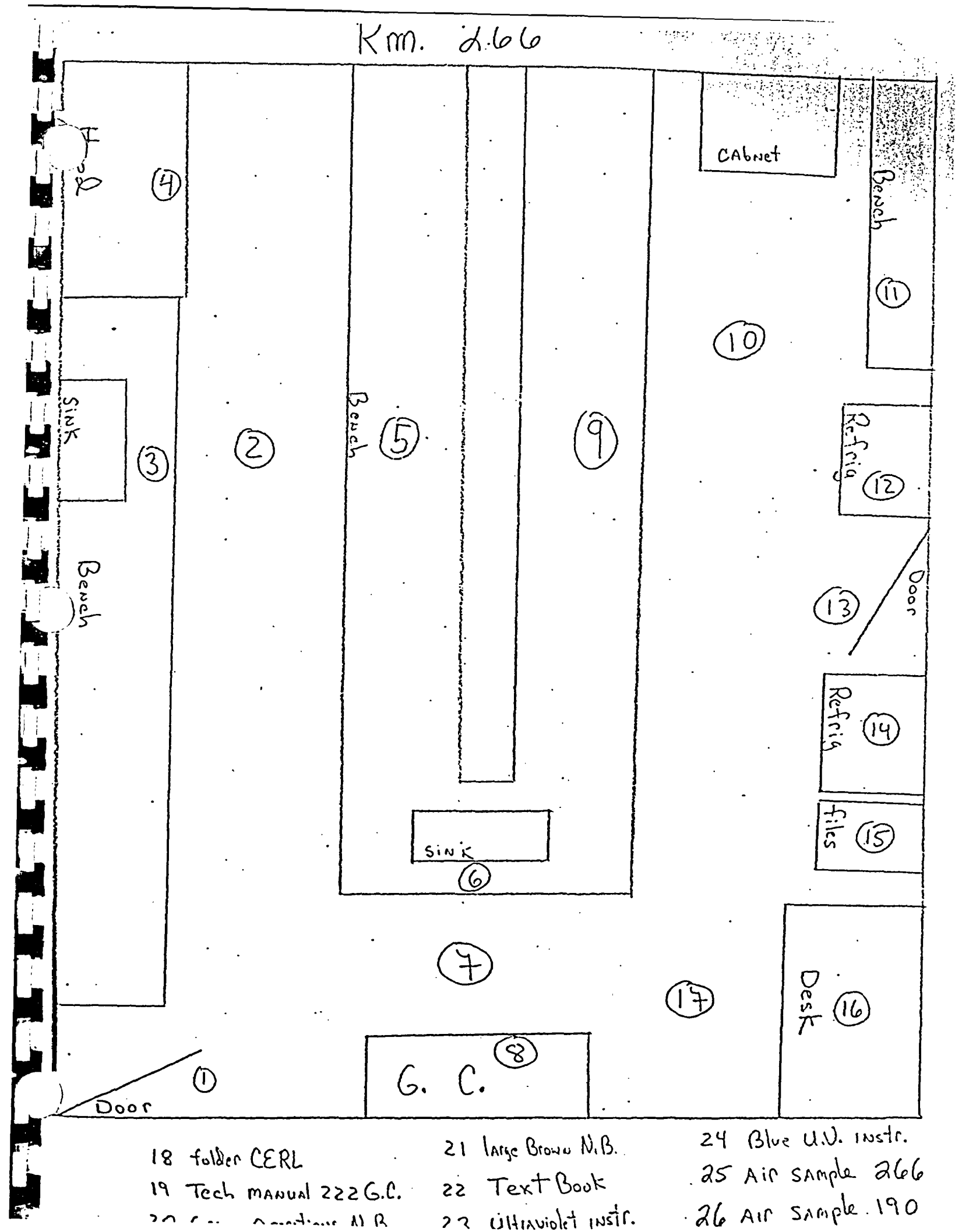
6/22/82

Swipes of Room 266

ple	^3H Activity		^{14}C Activity		
	3	10.000	193	102	
	19.3	9.5	16.8	9.5	
	4	10.000	179	155	
T	17.9	9.5	15.5	9.5	
	5	10.000	153	163	
	15.3	9.5	16.3	9.5	
	6	10.000	172	153	
3	17.8	9.5	15.3	9.5	
	7	10.000	188	164	
4	18.9	9.5	16.4	9.5	
	8	10.000	169	152	
5	16.9	9.5	15.9	9.5	
	9	10.000	145	163	
6	14.5	9.5	16.3	9.5	
	10	10.000	182	133	
7	18.3	9.5	13.3	9.5	
	11	10.000	188	158	
8	18.9	9.5	15.9	9.5	
	12	10.000	190	147	
9	18.9	9.5	14.3	9.5	
	13	10.000	203	155	
10	21.3	9.5	15.5	9.5	
	14	10.000	184	162	
11	18.4	9.5	16.8	9.5	
	15	10.000	193	152	
	19.3	9.5	15.3	9.5	
	16	10.000	197	155	
13	18.7	9.5	15.9	9.5	
	17	10.000	214	153	
14	21.4	9.5	15.9	9.5	
	18	10.000	198	130	
15	15.1	9.5	13.3	10.5	
	19	10.000	170	139	
16	17.0		13.9	9.5	
	20	10.000	198	135	
17	18.9	9.5	13.9	9.5	
	21	10.000	154	124	
18	15.4	9.5	14.3	9.5	
	22	10.000	210	157	
19	21.9	9.5	15.3	9.5	
	23	10.000	168	169	
20	16.9	9.5	16.8	9.5	
	24	10.000	168	142	
21	16.9	9.5	14.8	9.5	
	25	10.000	194	135	
22	19.4	9.5	13.9	9.5	
	26	10.000	170	145	
23	19.1	9.5	14.8	9.5	
	27	10.000	149	141	
24	14.6	9.5	16.1	9.5	
	28	10.000	155	170	
25	15.5	9.5	17.1	9.5	
	29	10.000	141	156	
26	14.1	9.5	15.9	9.5	

← Tech. manual 222 G.C.

← Air sample 266

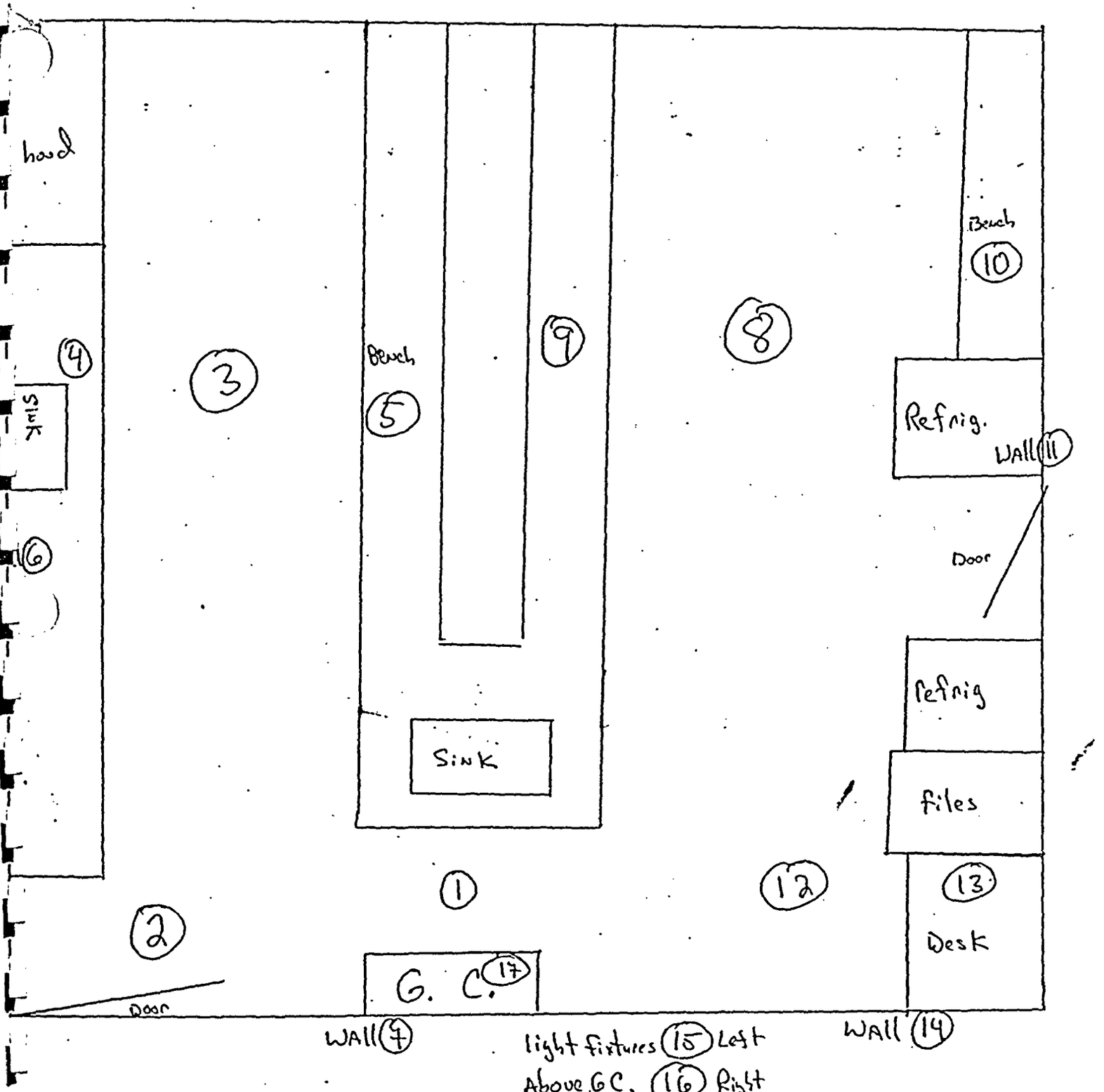


18 folder CERL
19 Tech manual 222 G.C.
20 [illegible] N.B.
21 large Brown N.B.
22 Text Book
23 Ultraviolet instr.
24 Blue U.V. instr.
25 Air sample 266
26 Air sample 190

82-6

Swipe Survey of
Rm 266 7/12/82

.8638	266	5.000	306	97	Swipe 1
73.2 7.5		19.4 .0			
.7865	267	5.000	327	98	2
65.4 7.5		19.4 .0			
.8814	268	5.000	382	112	3
76.4 7.5		22.6 9.5			
.8127	269	5.000	326	98	4
65.8 7.5		18.4 .0			
.8291	270	5.000	376	98	5
75.2 7.5		19.0 .0			
.7915	271	5.000	367	104	6
73.4 7.5		20.8 9.5			
.8205	272	5.000	330	94	7
66.0 7.5		18.8 .0			
.8156	273	5.000	383	97	8
64.0 7.5		17.4 .0			
.8205	274	5.000	358	98	9
71.4 7.5		19.4 .0			
.8315	275	5.000	351	90	10
70.2 7.5		19.2 .0			
.8168	276	5.100	388	95	11
77.0 7.5		19.2 .0			
.8202	277	5.000	360	89	12
72.0 7.5		17.8 .0			
.8158	278	5.000	351	[illegible]	13
70.0 7.5		19.4 .0			
.8154	279	5.000	324	91	14
66.9 7.5		15.0 .0			
.8245	280	5.000	331	95	15
66.2 7.5		17.0 .0			
.8152	281	5.000	375	89	16
75.0 7.5		17.2 .0			
.8326	282	5.000	351	95	17
70.2 7.5		19.0 .0			
.8393	283	5.000	362	[illegible]	Swipe Alone
64.0 7.5		19.[illegible] .0			


hood
4
3
Sink
6
Bench
5
9
8
Bench
10
Refrig.
Wall 11
Door
refrig
Sink
files
1
12
13
Desk
2
G. C. 17
Door
Wall 7
light fixtures 15 Left
Above G.C. 16 Right
Wall 14

U.S. Environmental Protection Agency
Western Ecology Division

NRC Radioactive Materials License No. 36-12343-02 Termination and Facility Decommissioning

Date: **November 30, 2004**
Subject: **Room Survey: Main Building 270 Final Contamination Survey.**

Description and Historic Use:

Double lab (450 ft^2). Carbon-14 and phosphorus-32 tracers, and hydrogen-3:scandium and nickel-63 sealed sources. This room was decommissioned as a unrestricted area on July 5, 1996. No isotope tracer use since1993. The lab was re-designated restricted use for sealed source (nickel-63) instrumentation in 1997. There is no record of leakage of any sealed sources used in this area.

Surveys:

Total (fixed + removable) and removable contamination surveys were conducted in MB 270 at the time of restricted use decommissioning. The decommissioning records are enclosed. All points surveyed demonstrated no significant contamination. A removable contamination survey (15 sample points) was conducted in November, 2004 and counted for hydrogen-3, carbon-14, and nickel-63. No contamination was detected. This area meets the contamination criteria for unrestricted use based upon the isotopes used at our facilities. A HVAC duct swipe was made in November 2004 which detected 0.68 Bq/100 cm^2 carbon-14 contamination.

Records for this room clearly demonstrate that contamination surveys were regularly performed. Records of the most recent historic surveys (i.e. prior to the final decommissioning surveys) of MB 270 are included in this report.

The survey for total contamination was conducted using a Ludlum Model 3 Survey Meter equipped with a Ludlum Model 44-9, 12-cm^2 thin-window Geiger-Muller pancake detector. Removable contamination was determined using methanol-wetted swipes counted in a Packard 2200 CA dual channel Liquid Scintillation Counter.

NHEERL-WED

RADIATION AREA SURVEY

LOG NO. 04-26

DATE 11-29-04 LOCATION MB ROOM 270

INSTRUMENT PACKARD LSC 2200 CA

SERIAL NO. 036755

2-64 KeV Ni-63

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
1	16	LLDDS	ND*
2	13		
3	17		
4	19		
5	13		
6	16		
7	15		
8	13		
9	12		
10	15		
11	18		
12	18		
13	18		
14	17		
15	21		

$LLD_{95} = \left\{\left(\frac{\sqrt{17 \times 3}}{3}\right) \times 2.96\right\} + = 24$ CPM

BACKGROUND STANDARD (Ni-63 11,110 dpm) 17 CPM 11,290 dpm

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²

$LLD_{95} = \left\{\left(\text{---------}\right) \times 2.96\right\} + =$ CPM

BACKGROUND STANDARD ( )

COMMENTS: ND* = NOT DETERMINED. Below the detection Limit.

D. Mason
RADIATION SPCL.

11/30/04
DATE

NHEERL-WED

LOG NO. 04-26

RADIATION AREA SURVEY

DATE 11-29-04 LOCATION NIB ROOM 270

INSTRUMENT Packard LSC 2200 CA

SERIAL NO. Ø36755

^{3}H

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
		LLD95	
1	8		ND*
2	7		
3	6		
4	4		
5	4		
6	5		
7	2		
8	5		
9	7		
10	5		
11	5		
12	6		
13	4		
14	3		
15	6		

$LLD_{95} = \left\{\left(\frac{\sqrt{5 \times 3}}{3}\right) \times 2.96\right\} + = 9$ CPM

BACKGROUND STANDARD (^{3}H) 5 CPM (64,179 dpm) 62,633 dpm

^{14}C

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
		LLD95	
	14		ND*
	10		
	14		
	15		
	9		
	16		
	15		
	12		
	11		
	12		
	14		
	11		
	15		
	14		
	10		

$LLD_{95} = \left\{\left(\sqrt{15 \times 3}\right) \times 2.96\right\} + = 22$ CPM

BACKGROUND STANDARD (^{14}C) 22 CPM (84,000 dpm) 85,773 dpm

COMMENTS: ND* = NOT DETERMINED Below the detection Limits.

O. Moran
RADIATION SPCL.

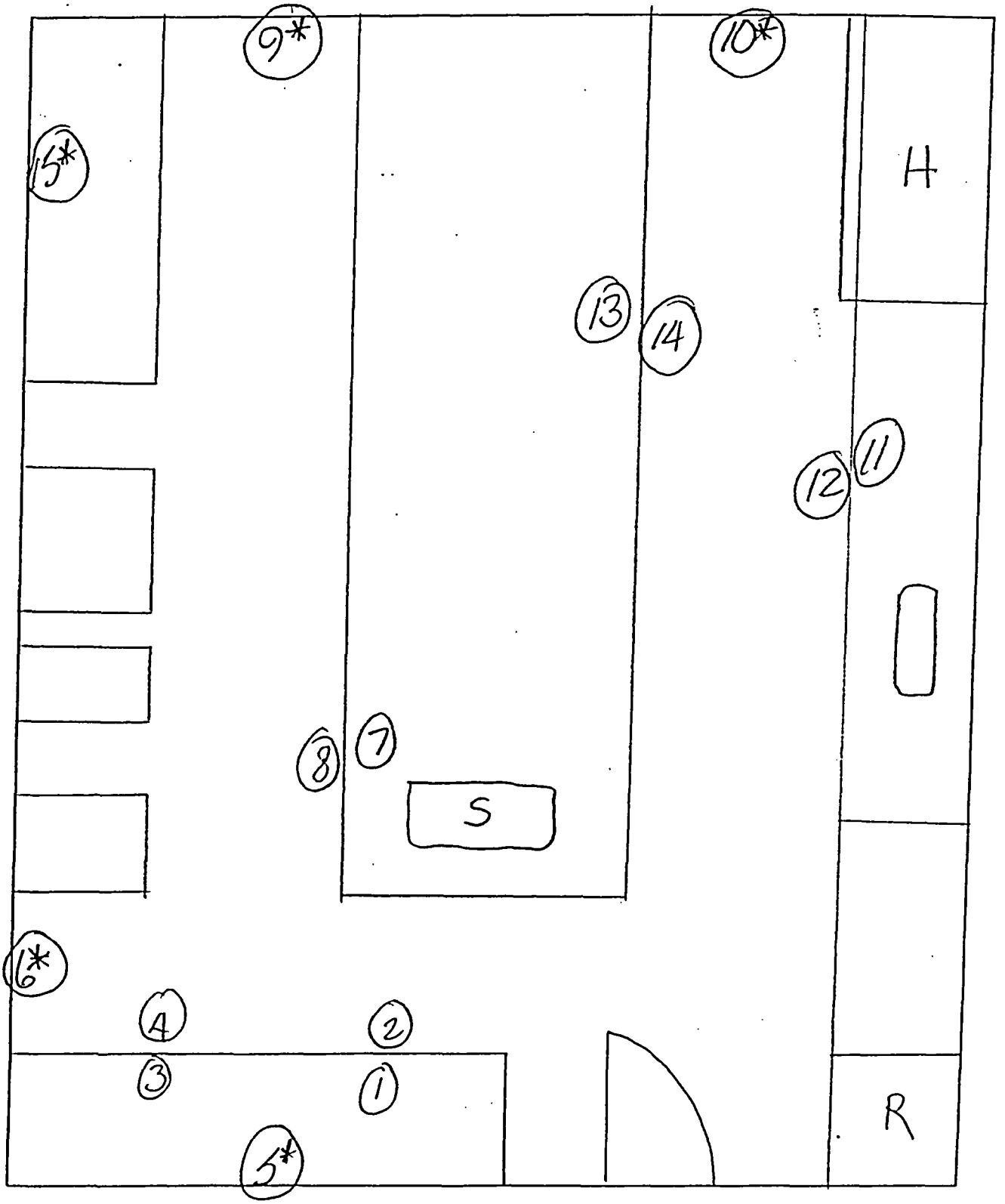
11-29-04
DATE

NHEERL-WED

LOG NO. 04-26

RADIATION AREA SURVEY MAP

LOCATION MB ROOM 270



DYNAMAC CORPORATION
200 SW 35th Street, Corvallis, OR 97333

MEMORANDUM

TO: Jay Gile, US EPA
FROM: Phil Monaco
DATE: July 5, 1996

OK 7/23/96

SUBJECT: Decommissioning of MB 270

The Biotech/Remediation lab (MB 270) is free of all radioactive materials. Equipment used in the PCP carbon-14 project was decontaminated. The fume hood, hood cabinet, and counters were cleaned, surveyed for removable and fixed radioactive contamination, and determined to be "clean". The small bench top refrigerator was found to have fixed contamination inside. After several cleanings the level of contamination remained unacceptable for un-restricted. Therefore, the refrigerator was labeled as contaminated and moved to the secured radioactive materials waste storage (CSB-1) until further use. Given the present "clean" state, I recommend that the room be "decommissioned" from radioisotope use and designated a un-restricted work area.

The results of the surveys are summarized below.

Fixed Contamination Survey (96-19)
Ludlum #3 S/N 77146 GM

Survey Description	Sample Size	dPM	Activity (pCi/20cm²)
Hood Interior	--	<LLD.	0 net
Hood Exterior	--	<LLD	0 net
Hood Cabinet	--	<LLD	0 net
Floor	2	<LLD	0 net
Wall	1	<LLD	0 net
Counters	2	<LLD	0 net
Phone	1	<LLD	0 net
Door	1	<LLD	0 net
Sink	2	<LLD	0 net
Appliances	3	<LLD	0 net
Refrigerator (bench)	1	200	568
Instruments	1	<LLD	0 net

Removable Contamination (96-17 and 96-18).
Packard LSC 2000CA S/N 036755

Survey Description	Sample Size	Gross CPM (range)	DPM	Activity (pCi/100cm²)
Hood Interior	4	21-32	<LLD	0 net
Hood Exterior	3	20-28	<LLD	0 net
Hood Cabinet	2	18-30	<LLD**	0 net
Floor	9	17-31	<LLD	0 net
Wall	1	24	<LLD	0 net
Counters	6	17-26	<LLD	0 net
Cabinet Face	3	17-24	<LLD	0 net
Cabinet Inside	1	15	<LLD	0 net
Phone	1	22	<LLD	0 net
Door	1	19	<LLD	0 net
Sink	2	16-18	<LLD	0 net
Appliances	2	20-32	<LLD	0 net
Refrigerator Bench (inside)	4	158-258	176-285	79-115
Refrigerator Bench (outside)	1	33	<LLD	0 net
HPLC	2	22-25	<LLD	0 net

LLD_{95}=Lower Limits of Detection at the 95% confidence level as calculated by: bkgrd cpm + bkgrd cpm*count time/count time * 2.96=34 cpm.

**LLD_{95}=Lower Limits of Detection at the 95% confidence level as calculated by: bkgrd cpm + bkgrd cpm*count time/count time * 2.96=38 cpm.

U.S EPA
ENVIRONMENTAL RESEARCH LABORATORY -CORVALLIS

Log No. 96-3

RADIATION CONTAMINATION SURVEY

Date: 2/12/96 Type of Survey: REMOVABLE CONTAMINATION

Isotope(s): β

Gross Background Counts: 25 ± CPM Total Count Time (min.):

Lower Limits of Detection: $(\sqrt{25 \times 2}/2)2.96 = 25 \pm 11 = (36$ cpm$)$ cpm

Instrument Used: ☐ GFPC ☑ LSC ☐ Ion Chamber ☐ Scintillation ☐ GM Model: Packard 2200CA S/N: 036755

Background: 25 CPM±SD 27 DPM±SD Standard (^{14}C NEN 4-11-76 84000 dpm = 84,181 dpm ✓ OK): % Error

Swipe No.	Room No.	Swipe Description	Nuclide: Gross per 100 cm² CPM±SD	Net DPM	Net Activity	Nuclide: per 100 cm² CPM±SD	Net DPM	Net Activity
2	236	Hood (North)	19	<LLD*	0** pCi			
3		Floor by N. Hood	76					
4		Desk	29					
5		Hood South	19					
		Floor by S. Hood	17					
		Sink	15					
		Door	25					
	256	Hood	20					
10		Floor by Hood	33					
		Oxidizer	23					
		Phone	19					
		LSC	18					
		door	26					
15	266	Hood	24					
		Floor by hood	20					
		Counter (opposite hood)	22					
		door	19					
	270	Hood (Sill/sash)	26					
20		Floor by hood	18					
		opposite Counter	19	↓	↓			

Comments: * < Lower limits of Detection (36 dpm)
** ~~Beta~~ Activity is below the detection limits.

Radiation Safety 2/26/96 Date

(9/90)

U.S EPA
ENVIRONMENTAL RESEARCH LABORATORY -CORVALLIS

Log No. 276

RADIATION CONTAMINATION SURVEY

Date: 2/12/96 Type of Survey: REMOVABLE CONTAMINATION

Isotope(s): P

Gross Background Counts: ____ ± ____ CPM Total Count Time (min.): ____

Lower Limits of Detection: ____ * ____ cpm

Instrument Used: ☐ GFPC ☐ LSC ☐ GM ☐ Ion Chamber ☐ Scintillation Model: ____ S/N: ____

Background: ____ CPM±SD ____ DPM±SD Standard (____): ____ % Error

Swipe No.	Room No.	Swipe Description	Nuclide: ____ per 100 cm² CPM±SD	Net DPM	Net Activity	Nuclide: ____ per 100 cm² CPM±SD	Net DPM	Net Activity
22	270	N. Sink	20	Lud*	Ø** µCi			
		Floor by N-Sink	16					
		Door	24					
25		phone	19					
	190	Sink	22					
		Floor by Sink	22					
		Floor by Sink (E)	24					
		Counter	24					
30		N. Counter	31					
		Desk	19					
		Phone	27					
		door	22					
34		N. Sink	26	↓	↓			

Comments:

Radiation Safety / Date

(9/90)

U.S. Environmental Protection Agency
Western Ecology Division

NRC Radioactive Materials License No. 36-12343-02 Termination and Facility Decommissioning

Date: **November 27, 2004**
Subject: **Room Survey: Main Building 282 Final Contamination Survey.**

Description and Historic Use:

Small single lab (225 ft^2). Potentially hydrogen-3 and carbon-14 tracers, and nickel-63 and hydrogen-3:scandium sealed sources. No isotope use since prior to 1986. There is no record of leakage of any sealed sources used in this area.

Surveys:

Total (fixed + removable) and removable contamination surveys were conducted in MB 282 in November 2004. This room was a unrestricted area since prior to 1986; radioactive materials were not used in this area after 1985.

All points surveyed (11 total and 11 removable) demonstrated no significant contamination. Four points indicated very low levels of removable contamination from tritium (0.25 – 1.02 Bq/100 cm^2). All other sampling points were at background. This area meets the contamination criteria for unrestricted use based upon the isotopes used at our facilities. .

Records for this room clearly demonstrate that contamination surveys were regularly performed, the area was not subject to any significant contamination events, and the room was maintained as a contaminate-free area. We determined it was unnecessary to conduct further contamination surveys in this area given these survey results and the Western Ecology Division's historic management of radioactive material use in this area. Records of the most recent historic surveys (i.e. prior to the final decommissioning surveys) of MB 282 are included in this report.

The survey for total contamination was conducted using a Ludlum Model 2000 Scaler equipped with a Ludlum Model 44-9, 12-cm^2 thin-window Geiger-Muller pancake detector. Removable contamination was determined using methanol-wetted swipes counted in a Packard 2200 CA dual channel Liquid Scintillation Counter.

NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY

FIXED SURVEY

DATE 11-11-04 LOCATION MB ROOM 282

INSTRUMENT Ludlum 2000 Scaler Pancake Probe 44-9

SERIAL NO. 83810 / PR070834

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
1	42	<LLD95	ND
2	34	0	
3	54		
4	35		
5	24		
6	35		
7	50		
8	36		
9	38		
10	32		
11	38		

$LLD_{95} = \left\{\left(\frac{\sqrt{38}}{0.5}\right) \times 2.96\right\}\% = 113$ CPM

BACKGROUND STANDARD (^{14}C 0.16 µCi) 76 CPM / 10540 CPM, 2.8% off.

Time 0.5'

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²

$LLD_{95} = \left\{\left(\text{---------}\right) \times 2.96\right\} + = $ CPM

BACKGROUND STANDARD ( ) _____

COMMENTS:

B. Moran
RADIATION SPCL.

11-16-04
DATE

NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY

DATE 11-11-04 LOCATION MB ROOM 282

INSTRUMENT Packard LSC 2200 CA

SERIAL NO. Q36755

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
1	5	<LLD95	ND
2	7	15	0.25
3	20	61	1.02
4	2	<LLD95	ND
5	5	<LLD95	ND
6	12	36	0.60
7	4	<LLD95	ND
8	1	↓	ND
9	6	↓	ND
10	9	21	0.35
11	4	<LLD95	ND

$LLD_{95} = \{(\text{---------}) \times 2.96\} + (= 7 \text{ CPM})$

BACKGROUND STANDARD (^3H 64,179 dpm) 4 cpm / 56,056 dpm

87% eff.

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
	15	<LLD95	ND
	13	↓	↓
	10	↓	↓
	14	↓	↓
	11	↓	↓
	11	↓	↓
	14	↓	↓
	14	↓	↓
	13	↓	↓
	14	↓	↓
	11	↓	↓

$LLD_{95} = \{(\text{---------}) \times 2.96\} + (= 30 \text{ CPM})$

BACKGROUND STANDARD (^{14}C 81,000 dpm) 22 cpm / 85,603 dpm

102% eff.

COMMENTS:

D. Moran
RADIATION SPCL.

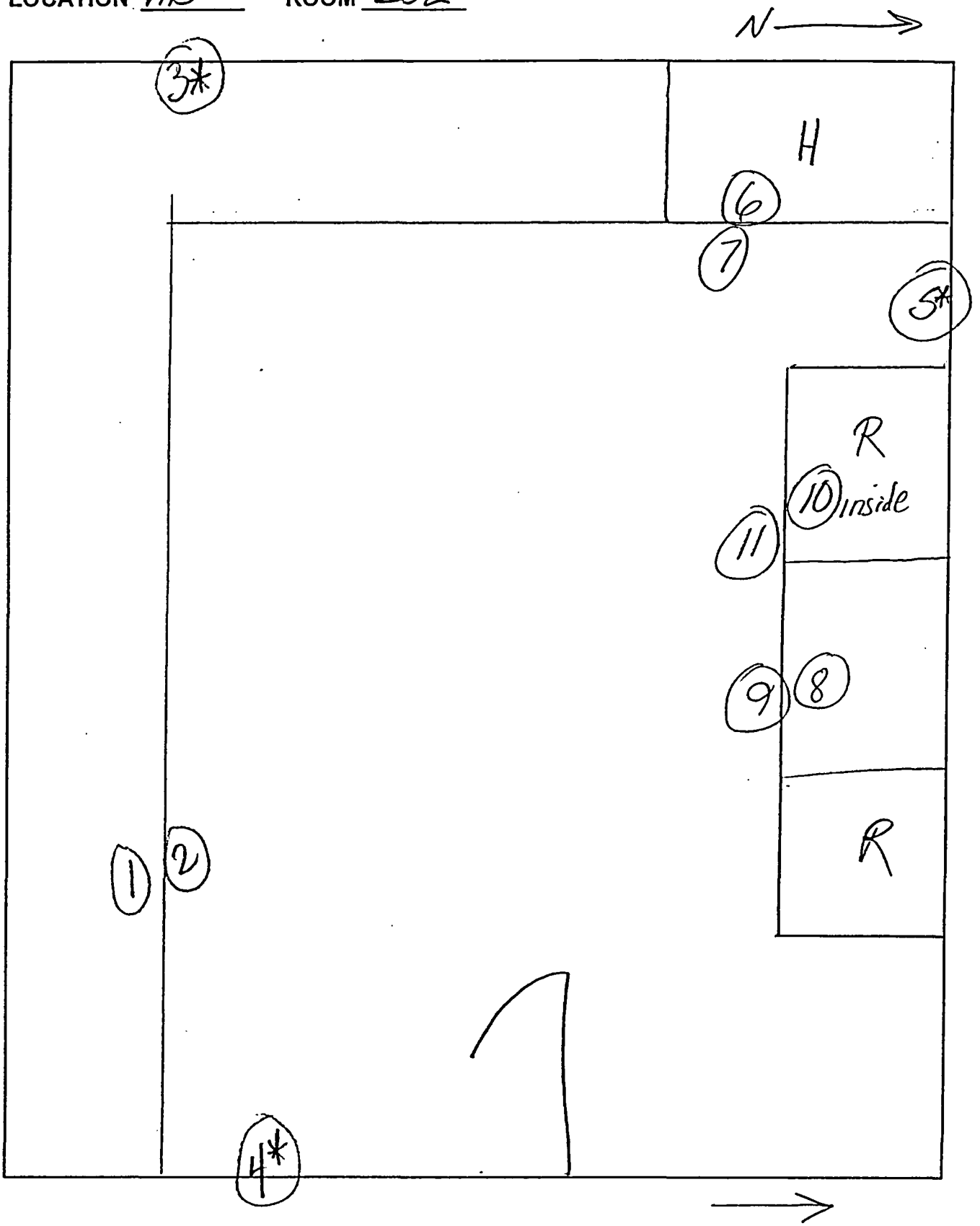
11-18-04
DATE

NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY MAP

LOCATION MB ROOM 282



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

282

SUBJECT: Clearance for CERL lab 282

DATE: Jan. 12, 1984

FROM: Tamotsu Shiroyama

TO: Jay Gile
Warren Tenbrook

As of December 20, 1983, CERL laboratory 282 has been cleaned and swiped for residual ^{14}C. The liquid and solid wastes are deposited in their proper waste containers and will be turned over to the RSO at the proper time.

Attached is the diagram of the swiped areas and their corresponding isotope counts. No significant counts were detected.

1/17/83

SAMPLE #	LOCATION OF SWIPE
1	Copy room - counter
2	Library - checkout counter
4	Rm 282 - hood flashing
5	rm 282 - Counter around sink
6	Rm 282 - South counter working area
7	Rm 282 - floor by sink
8	Rm 130 - top of flammable liquid cabinet
9	Rm 130 - hood flashing
10	Rm 130 - counter around East sink
11	Rm130 - floor by S. counter work area
12	Rm 132 - counter by oxidizer
13	Rm 132 - counter by sink
14	Rm 132 - floor by sink
15	Rm 132 - Mettler balance on N. counter
16	Rm 134 - floor by hall entry
17	Rm 134 - East counter below black shelves
18	Rm 134 - floor around RAM waste (N. wall)
19	Rm 266 - hood (including flashing)
20	Rm 266 - floor by nitrogen tank (hall door)
21	Rm 266 - raised counter (center), East end
22	Rm 266 - South center counter

WEEKLY SWIPE SURVEY 1/17/83

Week of 1/10/83 → 1/14/83

83-01

PROGRAM # : 6 LCR= 0 BKG= 0 % 2 SIGMA= .2
REGION A: LL-UL= 0- 12 LCR= 0 BKG= 0 % 2 SIGMA= .2
REGION B: LL-UL= 12- 156 LCR= 0 BKG= 0 % 2 SIGMA= .2
NUCLIDE 1 = 8031 NUCLIDE 2 = 42000
TIME= 30.00 QIP=SIE/AEC SCR= B/A K= 1.000

S	TIME	CPMA/K DPM1/K	%DEV	CPMB/K DPM2/K	%DEV	QIP	FLAGS	SCR	MIN
6	1 30.00	19.63	8.24	58.10	4.79	581.	B	2.959	30
6	2 30.00	21.33	7.91	54.00	4.97	608.	B	2.531	62
		20.48		56.05		595.		2.736	
6	4 30.00	.00	8.86	.00	4.94	536.	1?	.000	93
		.00		.00			?	.000	
6	5 30.00	.00	9.41	.00	5.00	496.	1?	.000	124
		.00		.00			?	.000	
6	6 30.00	.00	9.06	.00	4.94	522.	?	.000	154
		.00		.00			?	.000	
6	7 30.00	.00	9.72	.00	4.94	480.	1?	.000	185
		.00		.00			?	.000	
6	8 30.00	.00	9.00	1.85	4.80	528.	1?	.000	216
		0.00		2.32				.000	
6	9 30.00	.00	8.70	11.88	4.43	486.	1?	.000	247
		0.00		15.09				.000	
6	10 30.00	.00	8.61	.78	4.84	485.	1?	.000	278
		0.00		1.00				.000	
6	11 30.00	.00	11.0	.00	4.93	388.	1?	.000	309
		.00		.00			?	.000	
6	12 30.00	.15	8.04	.00	4.92	534.	1	.000	340
		.22		0.00				.000	
6	13 30.00	.00	8.24	.08	4.87	564.	1?	.000	371
		0.00		.10				.000	
6	14 30.00	.00	11.2	.00	4.98	390.	1?	.000	402
		.00		.00			?	.000	
6	15 30.00	.00	8.91	13.55	4.38	496.	1?	.000	433
		0.00		17.15				.000	
6	16 30.00	.00	10.6	.00	5.08	421.	?	.000	464
		.00		.00			?	.000	
6	17 30.00	.00	9.08	1.28	4.82	513.	1?	.000	494
		0.00		1.62				.000	
6	18 30.00	.00	12.3	.00	5.15	379.	?	.000	525
		.00		.00			?	.000	
6	19 30.00	9.95	6.62	.00	5.01	570.	1	.000	556
		13.44		0.00				.000	
6	20 30.00	42.15	4.61	1.82	4.80	489.		.043	587
		70.13		.31				.004	
6	21 30.00	.00	9.81	.00	5.01	452.	?	.000	618
		.00		.00			?	.000	
6	22 30.00	.00	11.1	.00	5.07	440.	?	.000	649
		.00		.00			?	.000	

1/17/83
SWIPES –

20 COPY ROOM
21 LIBRARY

1 282
2
3
4
5 130
6
7
8
9 132
10
11
12
13 134
14
15
16 266
17
18
19

S.S #83-1

REMOVABLE CONTAMINATION LEVELS (SMEARS)*

M McKenzie-Carter
Surveyor

Weekly Swipe - Rm 282 (Nyholm)
Purpose of Survey

11/4/82
Date

82-08

	1	2	3	4	5	6	7	8
Location	BKG CPM	Gross β cpm w/ ^3H	Net β cpm w/ ^3H	Gross β cpm w/o ^3H	Net β cpm w/o ^3H	Net β µCi w/o ^3H	Net ^3H cpm	Net ^3H µCi
Counter, left of work area	40.9	34.4	0					
Hood area	40.9	35.9	0					
Sink area	41.4	42.3	0.9					
FLOOR	41.4	39.5	0					

* No smearing efficiency value is factored into these results.

Instrument used: NMC GFPC #160 (Rm 190)

$LLD_{(95\%)}$ = _____ cpm

$LLD_{(\beta\ w/o\ ^3H)}$ in µCi = _____ µCi

$LLD_{(^3H)}$ in µCi = _____ µCi

USE REVERSE SIDE FOR CALCULATIONS

REMOVABLE CONTAMINATION LEVELS (SMEARS)*

M. McKenzie-Carter
Surveyor

Weekly Swipe
Rm 282
Purpose of Survey

11/10/82
Date

82-09

	1	2	3	4	5	6	7	8
Location	BKG CPM	Gross β cpm w/ ^3H	Net β cpm w/ ^3H	Gross β cpm w/o ^3H	Net β cpm w/o ^3H	Net β μCi w/o ^3H	Net ^3H cpm	Net ^3H μCi
HOOD AREA	40.1	45.1	5.0					
COUNTER-TOP, BY TEST TUBES	40.1	43.0	2.9					
FLOOR IN FRONT OF HOOD	40.1	35.9	0					
COUNTER TOP AROUND SINK	40.1	42.8	2.7					

* No smearing efficiency value is factored into these results.

Instrument used: NNC GFPC. #160 Rm 190

$LLD_{(95\%)}$ = _____ cpm

$LLD_{(\beta\ w/o\ ^3H)}$ in μCi = _____ μCi

$LLD_{(^3H)}$ in μCi = _____ μCi

USE REVERSE SIDE FOR CALCULATIONS

REMOVABLE CONTAMINATION LEVELS (SMEARS)*

VICENTE-CARTER
Surveyor

WEEKLY SWIPES OF ACTIVE CASS. 282
Purpose of Survey

11/18/82
Date

	1	2	3	4	5	6	7	8
Location	BKG CPM	Gross β cpm w/ ^3H	Net β cpm w/ ^3H	Gross β cpm w/o ^3H	Net β cpm w/o ^3H	Net β μCi w/o ^3H	Net ^3H cpm	Net ^3H μCi
HOOD PLUMBING	37.9	59.8	21.9					
AROUND TOP OF SINK (COUNTER)	37.9	38.2	0.3					
COUNTER TOP, BY MICROPIPETS	37.9	42.2	4.3					

* No smearing efficiency value is factored into these results.

Instrument used: NMC GFPC #160 (Rm 190 CORE)

LLD(95%) = _____ cpm

LLD(β w/o ^3H) in μCi = _____ μCi

LLD(^3H) in μCi = _____ μCi

USE REVERSE SIDE FOR CALCULATIONS

REMOVABLE CONTAMINATION LEVELS (SMEARS)*

M. McKenzie-Carter — Surveyor

Weekly swipe of Lab 282 (Nyholm) — Purpose of Survey

10/29/82, HH — Date

82-0

	1	2	3	4	5	6	7	8
Location	BKG	Gross β cpm w/ ^3H	Net β cpm w/ ^3H	Gross β cpm w/o ^3H	Net β cpm w/o ^3H	Net β μCi w/o ^3H	Net ^3H cpm	Net ^3H μCi
Counter, in front of sink	41.2	412	0					
Hood flashing	41.2	38.7	0					
floor by hood and work area	39.9	37.2	0					
counter-top, left of work area	39.9	56.0	16.1					

* No smearing efficiency value is factored into these results.

Instrument used: NMC GFPC Ser. #160 / Rm 190

$LLD_{(95\%)}$ = _____ cpm

$LLD_{(\beta\ w/o\ ^3H)}$ in μCi = _____ μCi

$LLD_{(^3H)}$ in μCi = _____ μCi

USE REVERSE SIDE FOR CALCULATIONS

U.S. Environmental Protection Agency
Western Ecology Division

NRC Radioactive Materials License No. 36-12343-02 Termination and Facility Decommissioning

Date: **November 27, 2004**
Subject: **Room Survey: Main Building 284 Final Contamination Survey.**

Description and Historic Use:

Double lab (450 ft^2). Hydrogen-3:scandium and nickel-63 sealed sources. No isotopes since 1996. There is no record of leakage of any sealed sources used in this area.

Surveys:

Total (fixed + removable) and removable contamination surveys were conducted in MB 284 in November 2004.

All points surveyed (25 total and 25 removable) demonstrated no significant contamination. One point indicated possible fixed contamination of 9 Bq/100 cm^2). All other sampling points were at background. This area meets the contamination criteria for unrestricted use based upon the isotopes used at our facilities. A HVAC duct swipe was made in November 2004 which detected no contamination.

Records for this room clearly demonstrate that contamination surveys were regularly performed, the area was not subject to any significant contamination events, and the room was maintained as a contaminate-free area. We determined it was unnecessary to conduct further contamination surveys in this area given these survey results and the Western Ecology Division's historic management of radioactive material use in this area. Records of the most recent historic surveys (i.e. prior to the final decommissioning surveys) of MB 290 are included in this report.

The survey for total contamination was conducted using a Ludlum Model 2000 Scaler equipped with a Ludlum Model 44-9, 12-cm^2 thin-window Geiger-Muller pancake detector. Removable contamination was determined using methanol-wetted swipes counted in a Packard 2200 CA dual channel Liquid Scintillation Counter.

NHEERL-WED

LOG NO. 04-25

RADIATION AREA SURVEY

FIXED SURVEY

DATE 11-24-04 LOCATION MB ROOM 284

INSTRUMENT Ludlum 2000 Scaler Pancake Probe 44-9

SERIAL NO. 83810 / PR070834

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
1	58	LLD95	ND*
2	46		
3	70		
4	40		
5	36		
6	48		
7	52		
8	50		
9	76		
10	84		
11	74		
12	38		
13	74		
14	36		
15	44		
16	42		
17	82		
18	56		
19	88	520	9
20	32	LLD95	ND*
21	40		
22	60		
23	32		
24	72		
25	46		

$LLD_{95} = \left\{ \left(\frac{\sqrt{62}}{0.5} \right) \times 2.96 \right\} + 108$ CPM

BACKGROUND STANDARD (^{14}C 0.168 µCi) 62 CPM / 18,347 CPM

4.9% eff.

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²

$LLD_{95} = \left\{ \left(\quad \right) \times 2.96 \right\} + =$ CPM

BACKGROUND STANDARD ( ) _____

COMMENTS: ND* = NOT DETERMINED. Below the Detection Limits.

RADIATION SPCL.

11-24-04
DATE

NHEERL-WED

LOG NO. 04-25

1/1

RADIATION AREA SURVEY

REMOVABLE

DATE 11-24-04 LOCATION MB ROOM 284

INSTRUMENT Packard 2200 CA LSC

SERIAL NO. 0036755

3H

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
1	8	<LLD95	ND**
2	7		
3	1		
4	8		
5	4		
6	4		
7	3		
8	9		
9	5		
10	5		
11	8		
12	2		
13	5		
14	8		
15	7		
16	2		
17	8		
18	6		
19	6		
20	6		
21	5		
22	9		
23	5		
24	3		
25	11		

$LLD_{95} = \left\{\left(\frac{\sqrt{21}}{3}\right) \times 2.96\right\} + = 12$ CPM

BACKGROUND STANDARD (^3H) 7 CPM 64,179 dpm 60,012 DPM

14C

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
	10	<LLD95	ND
	11		
	14		
	11		
	13		
	14		
	12		
	10		
	10		
	9		
	14		
	13		
	10		
	14		
	12		
	13		
	9		
	14		
	14		
	10		
	18		
	14		
	18		
	13		
	17		

$LLD_{95} = \left\{\left(\frac{\sqrt{39}}{3}\right) \times 2.96\right\} + = 19$ CPM

BACKGROUND STANDARD (^{14}C) 13 CPM 84,000 DPM 85,006 dpm

COMMENTS: ND** NOT DETERMINED. Less than the detection Limits

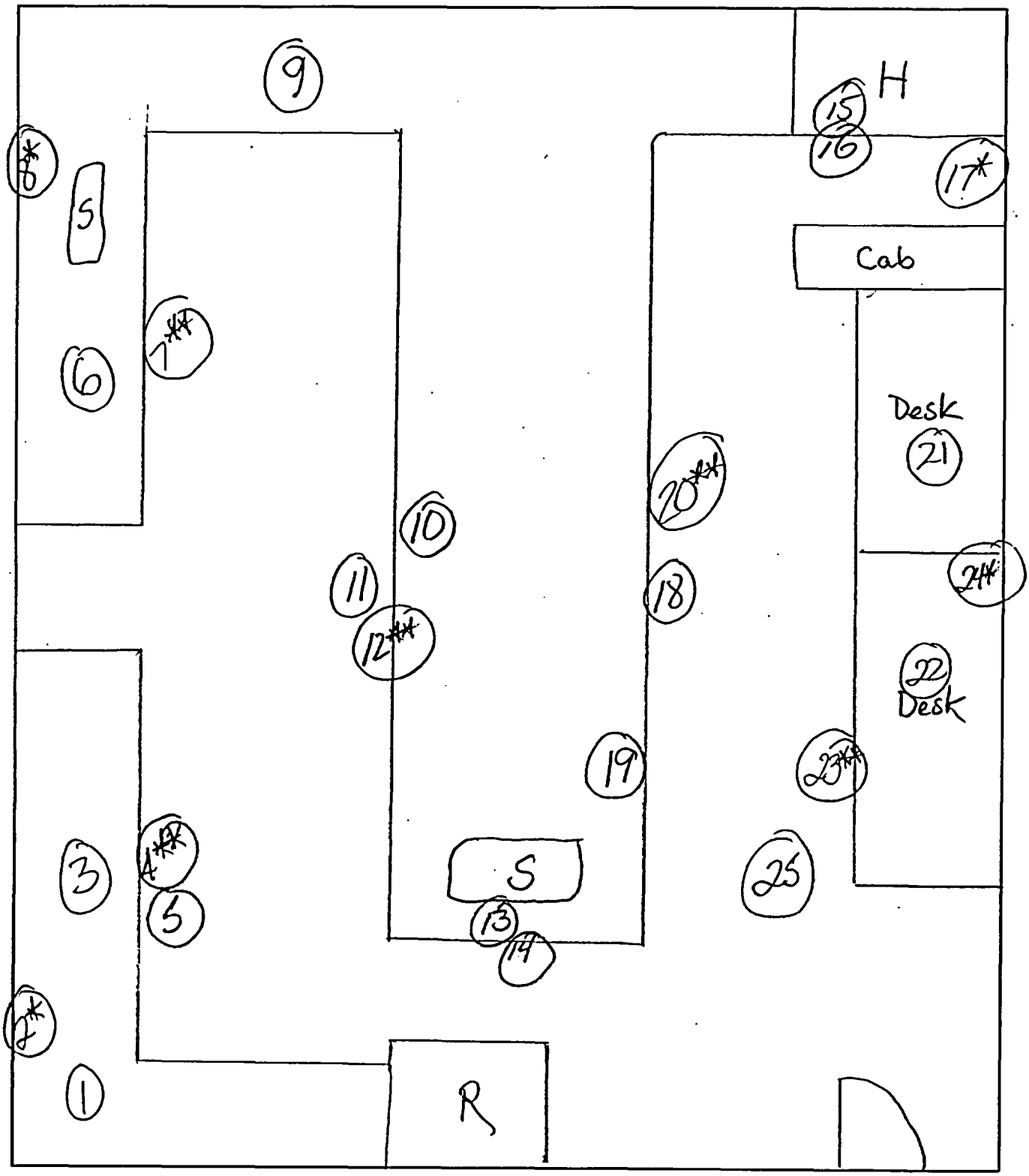
RADIATION SPCL. 11-26-04 DATE

NHEERL-WED

LOG NO. 04-25

RADIATION AREA SURVEY MAP

LOCATION MB ROOM 284



28C1 87-19

MB Swipes for Caused Contamination
July 1987

AREA CONTAMINATION SURVEY SHEET

Radionuclide(s) Surveyed: ^{14}C

Date: 7/22/87

Method of Detection: LSC

P. Monaco
Radiation Safety Technician

Swipe #	Location RM #	Area	Nuclide: ^{14}C NET CPM	NET DPM	µCi	Nuclide: NET CPM	NET DPM	µCi
30	190	N Bench	0					
31		N Sink	0					
32		Phone	0					
33		TYPE writer	0					
34		door	0					
35		S Sink	16	18	8×10^{-6}			
36		S Bench → W	0					
37		S Bench → W	24	27	1.2×10^{-5}			
38		S Bench → W	4	5	2.3×10^{-6}			
39		Refridg.	0					
40		floor → W	0					
41		floor → W	0					
42		floor → W	0					
43		N- draws	0					

Calculation of Lower Limits of Detection (LLD)

	Nuclide: ^{14}C	Nuclide:
Gross Background Counts:	450	
Total Background Count time:	20	

$$LLD (95\%) = \sqrt{\frac{\text{Gross Background Counts}}{\text{Count Time}}} \times 4.66$$

LLD (95%) = 5

REMARKS:

284

AREA CONTAMINATION SURVEY SHEET

Radionuclide(s) Surveyed: ^{14}C Date: 7/22/87

Method of Detection: LSC

D. Moran
Radiation Safety Technician

Swipe #	Location RM #	Location Area	Nuclide: NET CPM	Nuclide: NET DPM	Nuclide: µCi	Nuclide: NET CPM	Nuclide: NET DPM	Nuclide: µCi	
44	MB 2nd	258 SW hall	9	10					
45	2nd	W 246 HALL	0						
46		NW 226 Hall	0						
47		NE HALL	0						
48		E HALL	0						
49		SE Hall	6	7					
50	284	S Bench	0						
51		Floor	2	<LLD					
52		SE stair Hand Rail	0						
53	1st	SE on door	0						
54		SE Floor	0						
55		NE Floor	1	<LLD					
56		NW Floor	0						
57	130	GC	0						
58		Floor	0						

Calculation of Lower Limits of Detection (LLD) Nuclide: _____ Nuclide: _____

Gross Background Counts: _____ _____

Total Background Count time: _____ _____

$$\text{LLD (95\%)} = \sqrt{\frac{\text{Gross Background Counts}}{\text{Count Time}}} \times 4.66$$

LLD (95%)= _____ _____

REMARKS:

U.S. Environmental Protection Agency
Western Ecology Division

NRC Radioactive Materials License No. 36-12343-02 Termination and Facility Decommissioning

Date: **November 30, 2004**
Subject: **Room Survey: Main Building 290 Final Contamination Survey.**

Description and Historic Use:

Small single lab (225 ft^2). Nickel-63 sealed sources. No sealed sources since 1994. No tracer isotope use. There is no record of leakage of any sealed sources used in this area.

Surveys:

This area meets the contamination criteria for unrestricted use based upon the isotopes used at our facilities. A removable contamination survey was conducted in November, 2004. Ten points were sampled and counted for hydrogen-3, carbon-14, and nickel-63. No significant contamination was detected. One swipe indicated a very low level of contamination in the tritium range (14 dpm (0.23 Bq/100 cm^2)).

Records for this room demonstrate that contamination surveys were conducted when prudent, the area was not subject to any significant contamination events, and the room was maintained as a contaminate-free area. We determined it was unnecessary to conduct further contamination surveys in this area given these survey results and the Western Ecology Division's historic management of radioactive material use in this area. Records of the most recent historic surveys (i.e. prior to the final decommissioning surveys) of MB 290 are included in this report.

NHEERL-WED

LOG NO. 04-26

RADIATION AREA SURVEY

DATE 11-29-04 LOCATION MB ROOM 290

INSTRUMENT Packard LSC 2200 CA

SERIAL NO. 036735

2-64 KeV Ni-63

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
1	18	< LLD95	NOT
2	16		
3	17		
4	15		
5	14		
6	17		
7	16		
8	13		
9	13		
10	19	↓	↓

$LLD_{95} = \left\{\left(\frac{\sqrt{17.3}}{3}\right) \times 2.96\right\} + = 24$ CPM

BACKGROUND STANDARD (Ni-63 11,110 dpm) 17 CPM = 11,298 dpm

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²

$LLD_{95} = \{(\quad) \times 2.96\} + =$ CPM

BACKGROUND STANDARD ( )

COMMENTS: NOT = NOT DETERMINED. Below the detection limits.

D. Monaco
RADIATION SPCL.

11-30-04
DATE

NHEERL-WED

LOG NO. 04-26

RADIATION AREA SURVEY

DATE 11-29-04 LOCATION MB ROOM 290

INSTRUMENT PACKARD LSC 2200 CA

SERIAL NO. Ø36755

^3H

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
1	5	LLD_{95}	ND*
2	8	↓	↓
3	4	↓	↓
4	8	↓	↓
5	9	14	0.23
6	6	LLD_{95}	ND*
7	2	↓	↓
8	2	↓	↓
9	4	↓	↓
10	6	↓	↓

$LLD_{95} = \left\{\left(\frac{\sqrt{5 \times 3}}{3}\right) \times 2.96\right\} + = 9$ CPM

BACKGROUND STANDARD (^3H) 5 CPM (64,179 dpm) 62,633 dpm

^{14}C

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
	10	LLD_{95}	ND*
	11	↓	↓
	10	↓	↓
	10	↓	↓
	18	↓	↓
	12	↓	↓
	13	↓	↓
	16	↓	↓
	12	↓	↓
	15	↓	↓

$LLD_{95} = \left\{\left(\sqrt{15 \times 3}\right) \times 2.96\right\} + = 22$ CPM

BACKGROUND STANDARD (^{14}C) 22 CPM (84,000 dpm) 85,773 dpm

COMMENTS: ND* = NOT DETERMINED. Below the Detection Limits.

P Monaco
RADIATION SPCL.

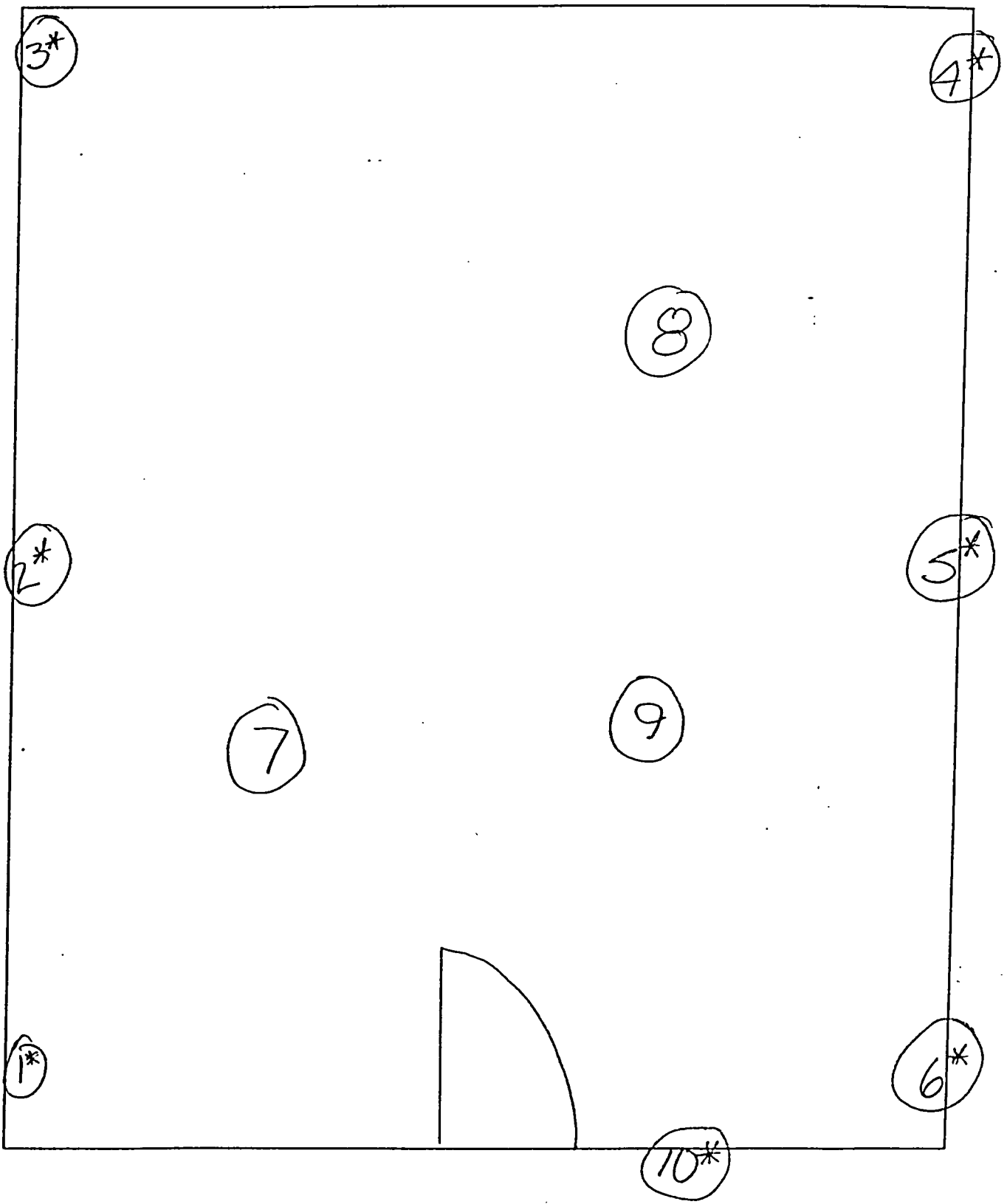
11-29-04
DATE

NHEERL-WED

LOG NO. 04-26

RADIATION AREA SURVEY MAP

LOCATION MB ROOM 290



U.S EPA
ENVIRONMENTAL RESEARCH LABORATORY -CORVALLIS

Log No. 92-25

RADIATION CONTAMINATION SURVEY

Date: 12-14-92 Type of Survey: Removable Contamination

Isotope(s): Ni-63 MB 220

Gross Background Counts: 430 ± CPM Total Count Time (min.): 5'

Lower Limits of Detection: $(\sqrt{430}/5)2.96 = 75$ = cpm

Instrument Used: ☒ ~~GFPC~~ ☐ LSC ☐ GM ☐ Ion Chamber ☐ Scintillation Model: S/N:

Background: 81 CPM±SD DPM±SD Standard (Ni-63 5nCi T199/11100): 70.2 EFF. % ~~Error~~

Swipe No.	Room No.	Swipe Description	Nuclide: Ni-63 per 100 cm² Net CPM±SD	Net DPM	Net Activity	Nuclide: ____ per 100 cm² CPM±SD	Net DPM	Net Activity
1a		TOP INSTRUMENT	~~0~~	LLD95	Ø			
1b		TOP INSTRUMENT	30					
2		GRATE	19					
3		Exhaust	16					
4		Counter	12					
5		1Floor	0					
6		Key pad	22					
7		Inkpads	13					
8		phone	20					
9		door	20					

Comments:

Philip A. Mount 12/14/92
Radiation Safety Date

(9/90)

U.S. Environmental Protection Agency
Western Ecology Division

NRC Radioactive Materials License No. 36-12343-02 Termination and Facility Decommissioning

Date: **November 27, 2004**
Subject: **Room Survey: Main Building 292 Final Contamination Survey.**

Description and Historic Use:

Small single lab (225 ft^2). Potentially sulfur-35 tracer. No isotope use since 1990.

Surveys:

Total (fixed + removable) and removable contamination surveys were conducted in MB 292 in November 2004.

All points surveyed (10 total and 10 removable) demonstrated no significant contamination. One point indicated very low levels of removable contamination from tritium (0.35 Bq/100 cm^2). All other sampling points were at background. There is no knowledge that tritium was ever used in this lab; sulfur-35 would be fully decayed. This area meets the contamination criteria for unrestricted use based upon the isotopes used at our facilities.

Records for this room clearly demonstrate that contamination surveys were regularly performed, the area was not subject to any significant contamination events, and the room was maintained as a contaminate-free area. We determined it was unnecessary to conduct further contamination surveys in this area given these survey results and the Western Ecology Division's historic management of radioactive material use in this area. Records of the most recent historic surveys (i.e. prior to the final decommissioning surveys) of MB 292 are included in this report.

The survey for total contamination was conducted using a Ludlum Model 2000 Scaler equipped with a Ludlum Model 44-9, 12-cm^2 thin-window Geiger-Muller pancake detector. Removable contamination was determined using methanol-wetted swipes counted in a Packard 2200 CA dual channel Liquid Scintillation Counter.

NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY

FIXED SURVEY

DATE 11-11-04 LOCATION MB ROOM 292

INSTRUMENT Ludlum 2000 Scaler Pancake Probe 44-9

SERIAL NO. 83810 / PR070834

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
1	36	LLD95	ND
2	50	↓	↓
3	42		
4	44		
5	30		
6	50		
7	62		
8	38		
9	28		
10	42	↓	↓

$LLD_{95} = \left\{ \left(\frac{\sqrt{38}}{0.5} \right) \times 2.96 \right\} \% = 113$ CPM

BACKGROUND STANDARD (^{14}C 0.168 µCi) 19540 CPM 2.8% eff.

Time 0.5'

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²

$LLD_{95} = \left\{ \left(\text{---------} \right) \times 2.96 \right\} + = $ CPM

BACKGROUND STANDARD ( )

COMMENTS:

D Monaco
RADIATION SPCL.

11-16-04
DATE

NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY

DATE 11-11-04 LOCATION MB ROOM 292

INSTRUMENT Packard 2200 CA LSC

SERIAL NO. Q36755

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
1	4	LLD 35	ND
2	2	↓	↓
3	2		
4	3		
5	9	21	0.35
6	6	LLD 15	ND
7	4	↓	↓
8	2		
9	3		
10	4		

$LLD_{95} = \{(\quad) \times 2.96\} + = 7$ CPM

BACKGROUND STANDARD (^3H 64,179 dpm) 4 CPM / 56,056 dpm

87% eff

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
	9	LLD 11	ND
	15	↓	↓
	15		
	11		
	10		
	14		
	14		
	13		
	15		
	13		

$LLD_{95} = \{(\quad) \times 2.96\} + = 30$ CPM

BACKGROUND STANDARD (^{14}C 84,000 dpm) 22 CPM / 85,603 dpm

102% eff

COMMENTS:

O'Meara
RADIATION SPCL.

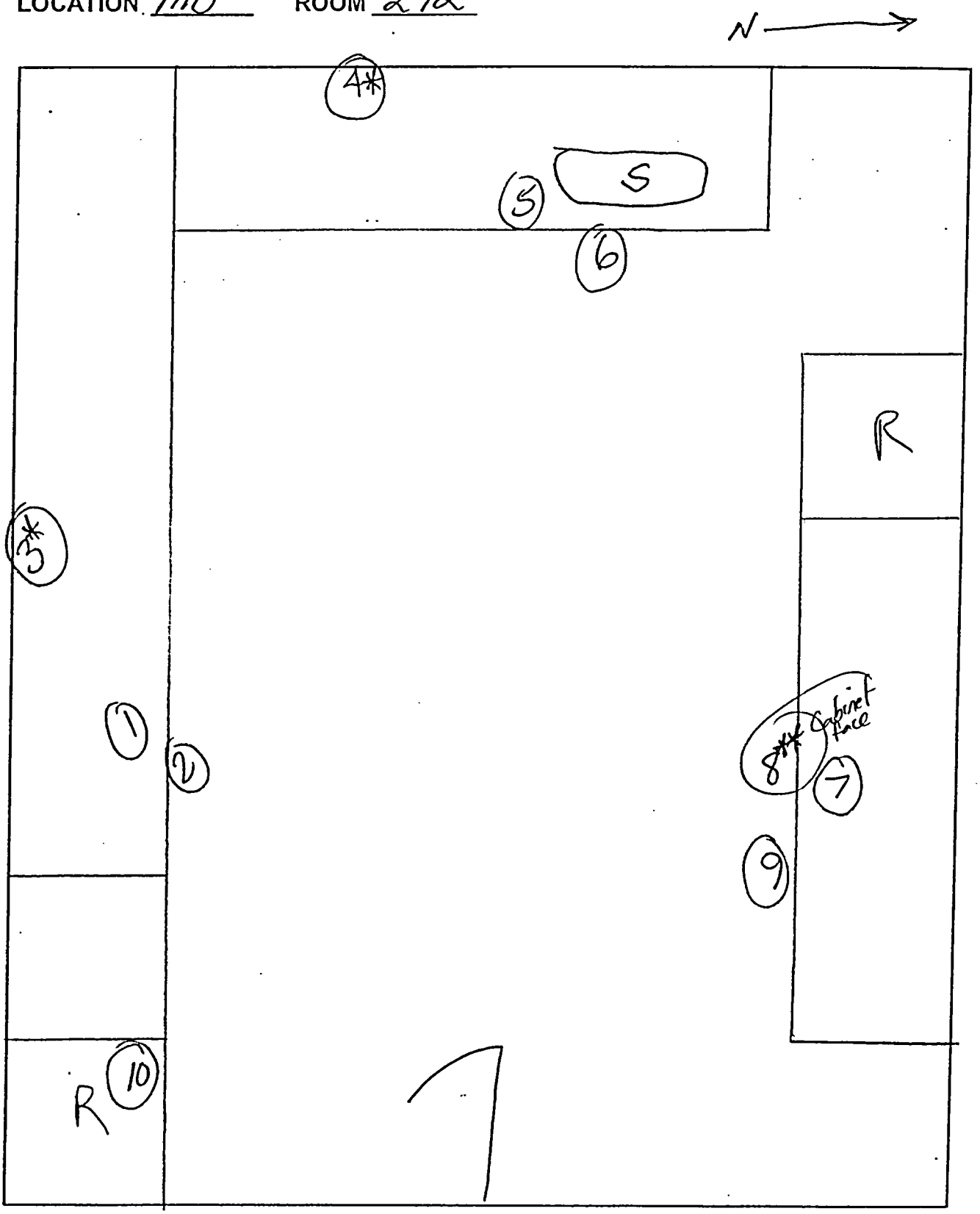
11-18-04
DATE

NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY MAP

LOCATION MB ROOM 292



NORTHROP SERVICES, INC. A Subsidiary of Northrop Corporation

ENVIRONMENTAL SCIENCES

200 Southwest 35th Street
Corvallis, Oregon 97333
Telephone: (503) 757-4664
(FTS-420-4664)

SUBJECT: Radiation Monitoring of CERL 292

DATE: December 3, 1986

FROM: Phil Monaco, Rad Safety

TO: Ray Titus

Following completion of the analysis of the labeled plant nutrient samples (C-14), I removed all sample wastes and swiped the lab to determine if there was any area contamination. As demonstrated by the survey results listed below, I found no above background levels of C-14:

November 11, 1986 Swipes of CERL 292

Swipe Location	Net DPM[1]
West Floor	0
Center Floor	$< LLD_{95}$*
East Floor	0
SW Counter	0
West Counter	0
Colorimeter	0
Pump	0
East Door	0
Waste Carboy	0

[1] DPM= Disintegrations per minute above background.

*LLD_{95}= Lower Limits of Detection at the 95% confidence level.

U.S. Environmental Protection Agency
Western Ecology Division

NRC Radioactive Materials License No. 36-12343-02 Termination and Facility Decommissioning

Date: **November 27, 2004**
Subject: **Room Survey: Main Building 294 Final Contamination Survey.**

Description and Historic Use:

Double lab (450 ft^2). Sulfur-35 tracer. No isotope use since 1990.

Surveys:

Total (fixed + removable) and removable contamination surveys were conducted in MB 294 in November 2004.

All points surveyed (15 total and 15 removable) demonstrated no significant contamination. Nine points indicated very low levels of removable contamination from tritium (0.22 – 0.43 Bq/100 cm^2). All other sampling points were at background. There is no knowledge that tritium was ever used in this lab; sulfur-35 would be fully decayed. This area meets the contamination criteria for unrestricted use based upon the isotopes used at our facilities. .

Records for this room clearly demonstrate that contamination surveys were regularly performed, the area was not subject to any significant contamination events, and the room was maintained as a contaminate-free area. We determined it was unnecessary to conduct further contamination surveys in this area given these survey results and the Western Ecology Division's historic management of radioactive material use in this area. Records of the most recent historic surveys (i.e. prior to the final decommissioning surveys) of MB 294 are included in this report.

The survey for total contamination was conducted using a Ludlum Model 2000 Scaler equipped with a Ludlum Model 44-9, 12-cm^2 thin-window Geiger-Muller pancake detector. Removable contamination was determined using methanol-wetted swipes counted in a Packard 2200 CA dual channel Liquid Scintillation Counter.

NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY

FIXED SURVEY

DATE 11-11-04 LOCATION MB ROOM 294

INSTRUMENT Ludlum 2000 Scaler Pancake Probe 44-9

SERIAL NO. 83810 / PR070834

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
1	48	LLD95	ND*
2	46		
3	38		
4	54		
5	28		
6	38		
7	56		
8	56		
9	48		
10	58		
11	32		
12	38		
13	42		
14	48		
15	26		

$LLD_{95} = \left\{\left(\frac{\sqrt{38}}{0.5}\right) \times 2.96\right\} + = 113$ CPM

BACKGROUND STANDARD (^{14}C 0.16 μCi) 76 CPM / 10340 CPM 2.8% eff.

Time 0.5'

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²

$LLD_{95} = \left\{\left(\text{----------}\right) \times 2.96\right\} + =$ CPM

BACKGROUND STANDARD ( ) _____

COMMENTS: ND* = NOT DETERMINED. Below the detection Limits of the instrument.

RADIATION SPCL.

11-16-04
DATE

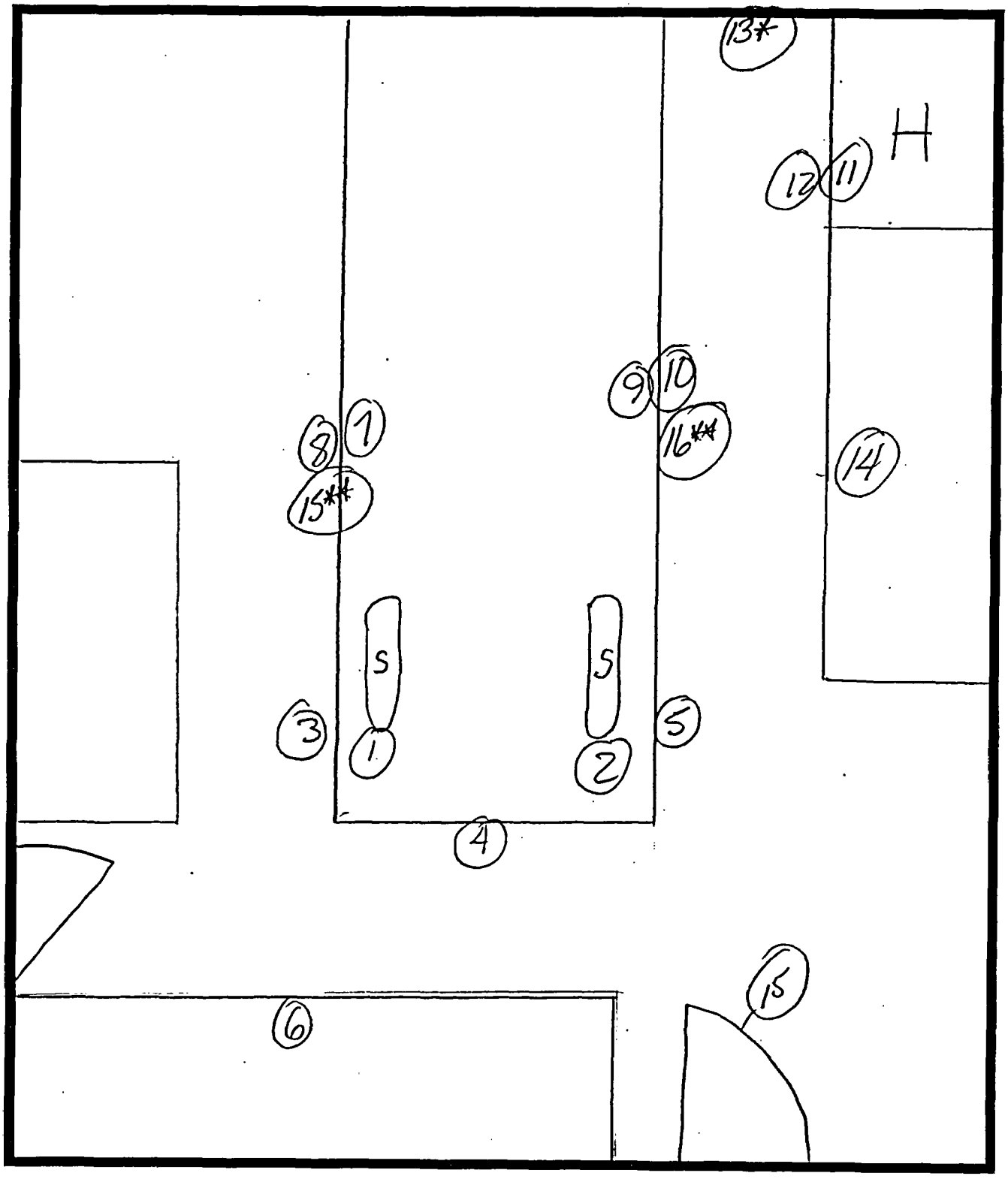
470287

NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY MAP

LOCATION MB ROOM 294



NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY

DATE 11-11-04 LOCATION MB ROOM 294

INSTRUMENT PACKARD LSC 2200 CA

SERIAL NO. 036755

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
1	9	21	0.35
2	5	$<LLD_{95}$	ND
3	7	13	0.22
4	7	15	0.25
5	5	$<LLD_{95}$	ND
6	7	13	0.22
7	4	$<LLD_{95}$	ND
8	3	↓	↓
9	6	↓	↓
10	10	26	0.43
11	7	17	0.28
12	7	15	0.25
13	4	$<LLD_{95}$	ND
14	9	21	0.35
15	7	15	0.25

LLD_{95} = {(---------) X 2.96} + (= 7 CPM)

BACKGROUND STANDARD (1% 64,179 dpm) 4 cpm 56,056 dpm

87% eff.

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
	15	$<LLD_{95}$	ND
	12	↓	↓
	15	↓	↓
	15	↓	↓
	15	↓	↓
	12	↓	↓
	13	↓	↓
	18	↓	↓
	10	↓	↓
	15	↓	↓
	12	↓	↓
	14	↓	↓
	14	↓	↓
	12	↓	↓
	13	↓	↓

LLD_{95} = {(---------) X 2.96} + (= 30 CPM)

BACKGROUND STANDARD (1% 84,000 dpm) 22 CPM 85,603 dpm

102% eff.

COMMENTS:

D Monaco
RADIATION SPCL.

11-18-04
DATE

U.S EPA
ENVIRONMENTAL RESEARCH LABORATORY -CORVALLIS

Log No. 90-40 1/3

RADIATION CONTAMINATION SURVEY

Date: 12-3-90 Type of Survey: Non-Removable Contamination

Isotope(s): β & γ

Gross Background Counts: ____ ± ____ CPM Total Count Time (min.): ____

Lower Limits of Detection: $\sqrt{75} \times 4.66 = 40.4$ = 40.4 cpm

Instrument Used: ☑ GFPC ☐ LSC ☐ GM ☐ Ion Chamber ☐ Scintillation Model: Ludlum #3 S/N: 77222

Background: 75 CPM±SD ____ DPM±SD Standard (^{137}Cs ≅ 1 μCi ≅ 11K CPM): 11,025 cpm % Error

Swipe No.	Room No.	Swipe Description	Nuclide: ____ per 100 cm² net CPM±SD	Net DPM	Net Activity	Nuclide: ____ per 100 cm² CPM±SD	Net DPM	Net Activity
	138 MB	Hoods	Ø					
		Sink	Ø					
		Floor	Ø					
		Desk	Ø					
		Door	Ø					
	132	Hoods	Ø					
		Sink	Ø					
		Floor	Ø					
		Bench	Ø					
		door	Ø					
	258	Hood Ft. wall	450					
		Floor	Ø					
		Sinks	Ø					
		Door	Ø					
	256	Hood	Ø					
		Floor	Ø					
		Phone	Ø					
		door	Ø					

Note: + will label this non-removable contamination

Radiation Safety 12/3/90 Date

(9/90)

U.S EPA
ENVIRONMENTAL RESEARCH LABORATORY -CORVALLIS

Log No. _____ 2/3

RADIATION CONTAMINATION SURVEY

Date: _____ Type of Survey: _____

Isotope(s): _____

Gross Background Counts: _____ ± _____ CPM Total Count Time (min.): _____

Lower Limits of Detection: _____ = _____ cpm

Instrument Used: ☐ GFPC ☐ LSC ☐ GM ☐ Ion Chamber ☐ Scintillation Model: _____ S/N: _____

Background: _____ CPM±SD _____ DPM±SD Standard (_____): _____ % Error

Wipe No.	Room No.	Swipe Description	Nuclide: _____ per 100 cm² net CPM±SD	Net DPM	Net Activity	Nuclide: _____ per 100 cm² CPM±SD	Net DPM	Net Activity
1	236	S. Hood	Ø					
		Floor	Ø					
		Sink	Ø					
		door	Ø					
		N. Hood	Ø					
	232b	Sink	Ø					
		Phone	Ø					
		Floor	Ø					
		Counter	Ø					
	228	S. Hood	Ø					
		Floor	Ø					
		door	Ø					
		Sink	Ø					
		N. Hood	Ø					
	236P	Phob lab. -Sink	Ø					
		Floor	Ø					
		Counter	Ø					
	294	N. Hood	Ø					
		Floor	Ø					
		Sink	Ø					

_____ / _____
Radiation Safety Date

U.S EPA
ENVIRONMENTAL RESEARCH LABORATORY -CORVALLIS

Log No. _____ 3/3

RADIATION CONTAMINATION SURVEY

Site: _____ Type of Survey: _____

Isotope(s): _____

Gross Background Counts: _____ ± _____ CPM Total Count Time (min.): _____

Lower Limits of Detection: _____ = _____ cpm

Instrument Used: ☐ GFPC ☐ LSC ☐ GM ☐ Ion Chamber ☐ Scintillation Model: _____ S/N: _____

Bkground: _____ CPM±SD _____ DPM±SD Standard (_____): _____ % Error

Type	Room No.	Swipe Description	Nuclide: _____ per 100 cm² CPM±SD	Net DPM	Net Activity	Nuclide: _____ per 100 cm² CPM±SD	Net DPM	Net Activity
	294	S. Hood	Ø					
	C-1	door	Ø					
		Floor	Ø					
	NERF	Rad Lab Hood	Ø					
		Floor	Ø					
		Bench	Ø					
		door	Ø					

_____ / _____
Radiation Safety Date

(9/70)

U.S. Environmental Protection Agency
Western Ecology Division:

Radiological Surveys
and Facilities Decommissioning
NRC Radioactive Materials License
No. 36-12343-02

VOLUME II

NOVEMBER 30, 2004

U.S. Environmental Protection Agency, Western Ecology Division:
Radiological Surveys and Facilities Decommissioning
NRC Radioactive Materials License No. 36-12343-02

Table of Contents

Table of Contents (cont'd)

Abbreviations and Glossary

Bkgrd = Background

Bq = Becquerel

CEB = Coastal Ecology Branch (Newport Facility)

CERL- Corvallis Environmental Research Laboratory (now called WED)

Check Source = Refers to an radioisotope source that is used as a reference radioactive source or standard which is either fixed on a surface or sealed into a container.

CSB = Chemical Storage Building

CPM = counts per minute

Dpm = disintegrations per minute

E = East

ECD = Electron Capture Detector

ERL-C = Environmental Research Laboratory – Corvallis (now called WED)

Ex = Exhaust. Used to refer to a ventilation exhaust vent or duct.

GC = Gas Chromatograph

GFPC = Gas Flow Proportional Counter

G-M = Geiger-Muller

Fixed = Used to refer to non-removable contamination.

HVAC = Heating, Ventilation, and Air Conditioning

LLD_{95} = Lower Limits of Detection at he 95% confidence level

LSC = Liquid Scintillation Counter

MB = Main Building

N = North

NA = Not Applicable

ND = Not determined

NEW = Newport

Non- removable = Use to refer to contamination that can not be readily removed from surfaces without abrasion.

PCEB = Pacific Coastal Ecology Branch (Newport Facility)

PCi = picoCuries

PEB = Plant Ecology Building

Removable = Refers to contamination that can readily be removed from surfaces.

Rm = Room

S = South

S Source = Sealed Source

Std = Standard. Refers to a radioisotope source that is used for a analytical standard.

TERA = Terrestrial Ecophysiological Research Area

TERF = Terrestrial Ecology Research Facility

Tracer = A radioisotope that is in a loose form (liquid, solid, or gas).

W = West

WED = Western Ecology Division

WFTS = Western Fish Toxicology Station

WLD = Wildlife Building (also called PEB)

WRF = Wildlife Research Facility (also called PEB)

WRS = Willamette Research Station

U.S. Environmental Protection Agency
Western Ecology Division

NRC Radioactive Materials License No. 36-12343-02 Termination and Facility Decommissioning

Date: **November 30, 2004**
Subject: **Room Survey: Newport L-106 Final Contamination Survey.**

Description and Historic Use:

Double lab (250 ft^2). Nickel-63 sealed source. No isotopes present in this area since 1997. There is no record of a leaking sealed source used in this area.

Surveys:

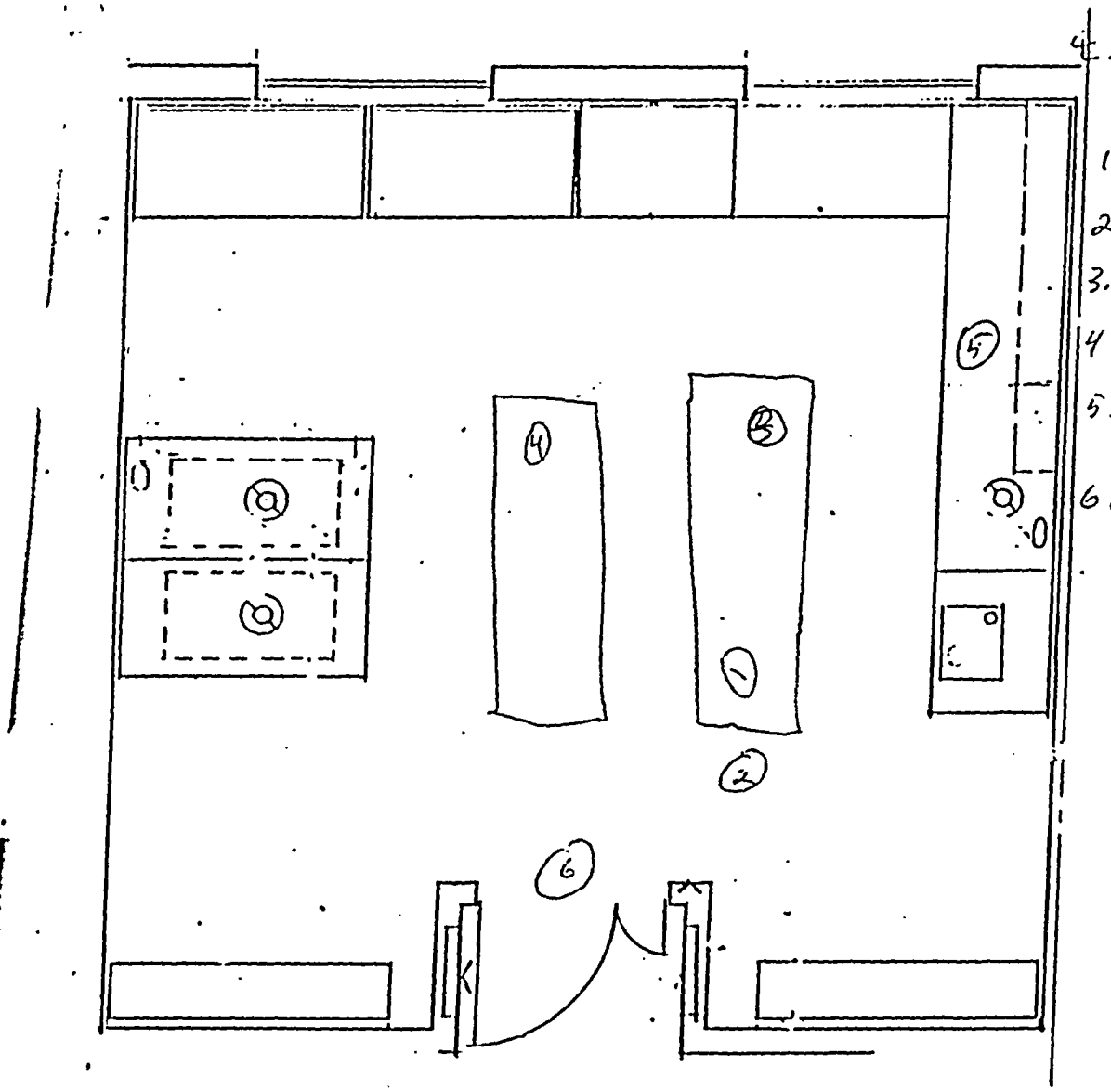
A removable contamination survey was conducted in L-106 in November 2004. The nine samples were counted for hydroigen-3, carbon-14, and nickel-63. All points sampled demonstrated no contamination. This area meets the contamination criteria for unrestricted use based upon the isotopes used at our facilities.

Records for this room clearly demonstrate that the area was not subject to any significant contamination events. We determined it was unnecessary to conduct further contamination surveys in this area given these survey results and the Western Ecology Division's historic management of radioactive material use in this area.

Removable contamination swipes were counted in a Packard 22000 CA dual channel Liquid Scintillation Counter.

11/29/04 Surface contam

04-28



1 Chromatography / L106 (A7)

Date or Survey: 11/29/04

Surveyor:

~~LLD = 6 Net DPM = 7×10⁻⁶~~ µCi BK = 20-80 CPM (counted for 1 min)

RSO Signature:

NHEERL-WED

LOG NO. 04-26

RADIATION AREA SURVEY

DATE 11-29-04 LOCATION New ROOM L106

INSTRUMENT Packard LSC 2200 CA

SERIAL NO. 036755

2-64 KeV Ni-63

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
1	16	LLD_{95}	ND*
2	17		
3	18		
4	19		
5	16		
6	20		
7	15		
8	14		
9	15		

$LLD_{95} = \left\{\left(\frac{\sqrt{17 \times 3}}{3}\right) \times 2.96\right\} + = 24$ CPM

BACKGROUND STANDARD (11,110 DPM Ni-63) 17 CPM) 11,250 dpm

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²

$LLD_{95} = \{(\quad) \times 2.96\} + =$ CPM

BACKGROUND STANDARD ( ) _____

COMMENTS: ND* = NOT DETERMINED. Below the detection limit.

RADIATION SPCL. 11-30-04 DATE

NHEERL-WED

LOG NO. 04-26

RADIATION AREA SURVEY

DATE 11-29-04 LOCATION NEWS ROOM L106

INSTRUMENT PACKARD 2200CA

SERIAL NO. 036755

^{3}H

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
1	5	<LLD95	ND*
2	5		
3	4		
4	6		
5	1		
6	1		
7	3		
8	3		
9	5		

$LLD_{95} = \left\{\left(\frac{\sqrt{7 \times 3}}{3}\right) \times 2.96\right\} + = (12 \text{ CPM})$

BACKGROUND STANDARD (^{3}H 7 CPM) 62910 dpm

^{14}C

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
	14	<LLD95	ND*
	12		
	13		
	15		
	11		
	12		
	12		
	12		
	16		

$LLD_{95} = \left\{\left(\frac{\sqrt{14 \times 3}}{3}\right) \times 2.96\right\} + = (20 \text{ CPM})$

BACKGROUND STANDARD (^{14}C 14 CPM / 84000 dpm) 85,457 dpm

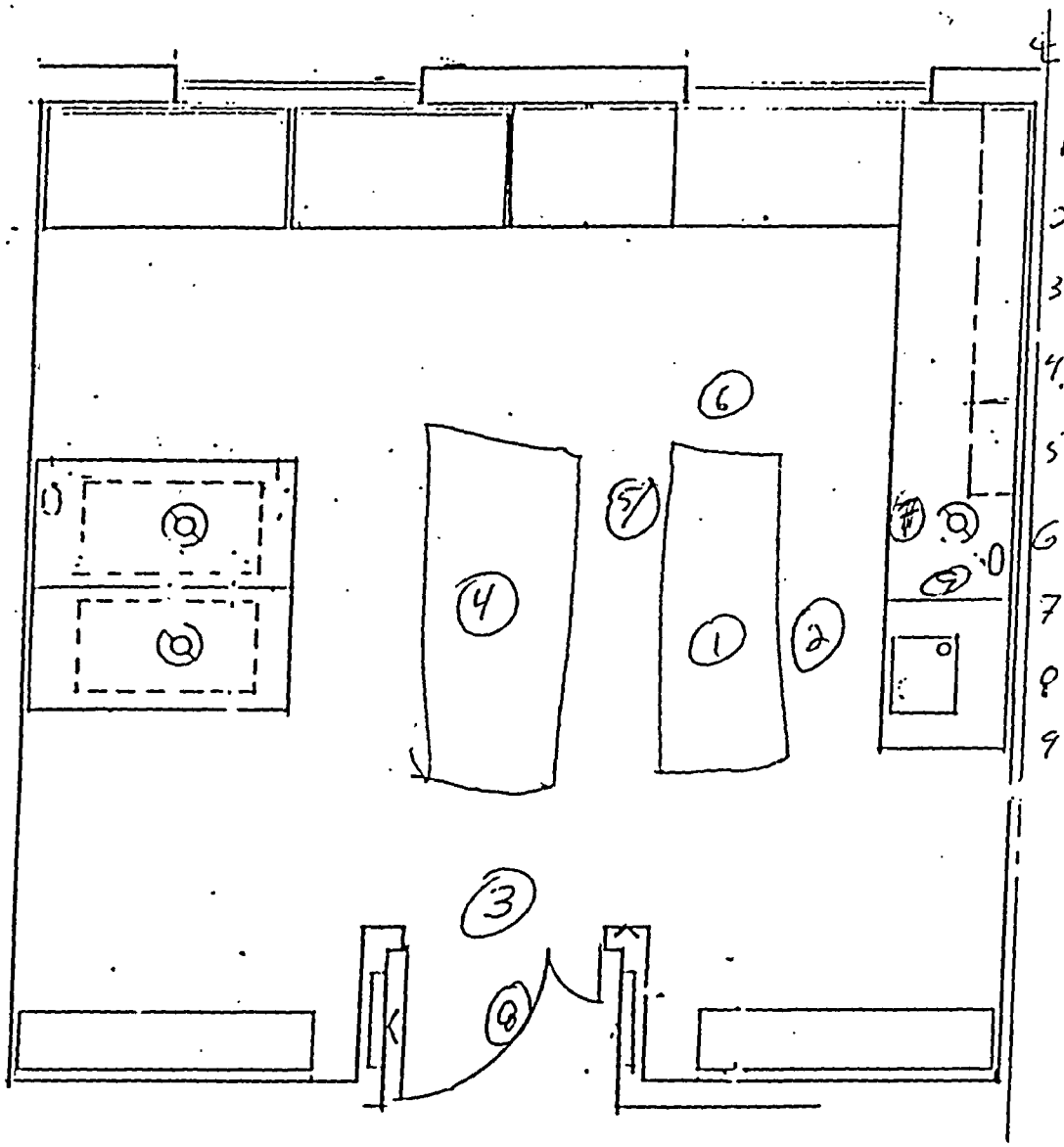
COMMENTS: ND* = NOT DETERMINED. Below the detection limits.

O. Mun
RADIATION SPCL.

11-29-04
DATE

11/29/04 Swipe

04-26



1 Chromatography / L106 (A7)

Date of Survey: 11/29/04

Surveyor: BL

LLD = 6 Net DPM = 2.7×10^{-6} µCi

RSO Signature:

U.S. Environmental Protection Agency
Western Ecology Division

NRC Radioactive Materials License No. 36-12343-02 Termination and Facility Decommissioning

Date: **November 27, 2004**
Subject: **Room Survey: Newport L-108 Final Contamination Survey.**

Description and Historic Use:

Single lab (250 ft^2). Hydrogen-3, carbon-14, and sulfur-35 tracers, and nickel-63 sealed source.

Surveys:

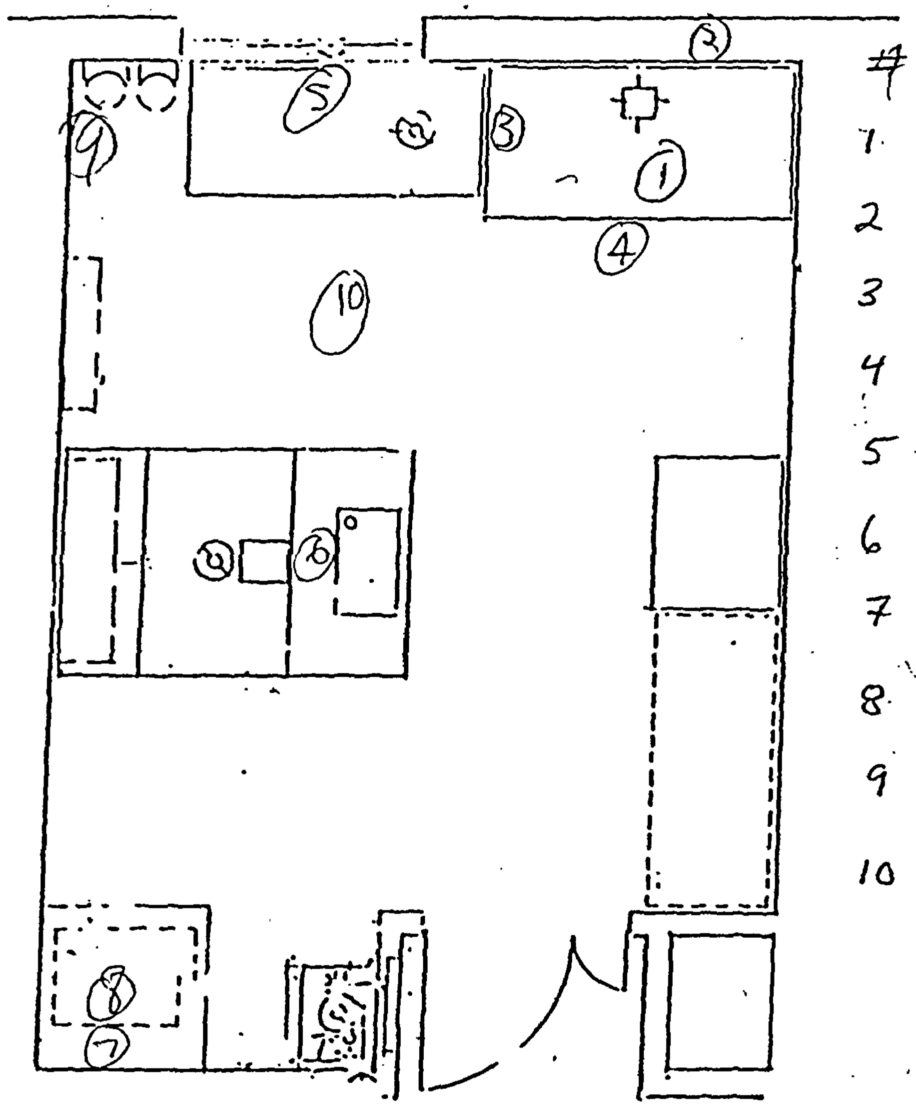
Total (fixed + removable) and removable contamination surveys were conducted in L-108 in June 2004.

All points surveyed (10 total and 21 removable) demonstrated no contamination. This area meets the contamination criteria for unrestricted use based upon the isotopes used at our facilities. A HVAC duct swipe was made in June 2004 which detected no contamination.

Records for this room clearly demonstrate that contamination surveys were regularly performed, the area was not subject to any significant contamination events, and the room was maintained as a contaminate-free area. We determined it was unnecessary to conduct further contamination surveys in this area given these survey results and the Western Ecology Division's historic management of radioactive material use in this area. Records of the most recent historic surveys (i.e. prior to the final decommissioning surveys) of L-108 are included in this report.

The survey for total contamination was conducted using a Technical Associates TBM-3 G-M Survey Meter equipped with a 20 cm^2 thin-window. Removable contamination swipes were counted in a Packard 2000 CA dual channel Liquid Scintillation Counter.

Fixed contam. survey meter



#	Location	Net CPM
1	Hood floor	0
2	Hood back wall	0
3	Hood side wall	0
4	floor at hood	0
5	Counter top	0
6	Sink	0
7	Freezer	0
8	Refer wall	0
9	floor	0
10	floor	0

N

Radiation Instrument / L108 (A8)

Date of Survey: 6/24

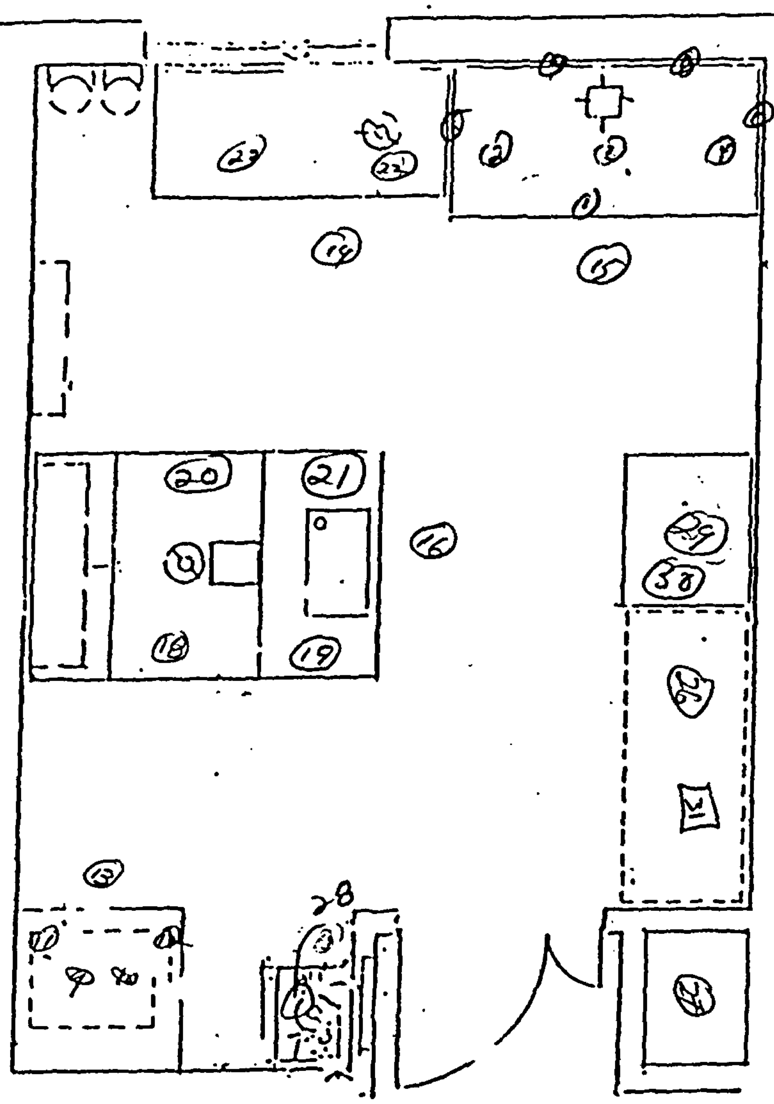
Surveyor: BZ

RSO Signature: Bruce J. [illegible]

BKG ≅ 150 max. CPM

~~LLD = 6 Net [illegible] = 2.2x10 -6~~

Decommissioning swipes 6/15/04



158-161

Swipe #	Net DPM	Be Q
1	0.8	<LLD
2	1.6	<LLD
3	3.4	<LLD
4	4.6	<LLD
5	1.9	<LLD
6	0.0	<LLD
7	3.9	<LLD
8	3.4	<LLD
9	9.8	<LLD
10	6.9	<LLD
11	0.0	<LLD
12	5.1	<LLD
13	2.0	<LLD
14	0.0	<LLD
15	5.0	<LLD
16	0.0	<LLD
17	1.7	<LLD
18	0.0	<LLD
19	0.0	<LLD
20	0.7	<LLD
21	0.0	<LLD
22	0.3	<LLD
23	3.4	<LLD
24	2.6	<LLD
25	0.0	<LLD
26	4.5	<LLD
27	0.0	<LLD
28	0.0	<LLD
29	0.0	<LLD
30	0.0	<LLD
31	0.0	<LLD

Radiation Instrument / L108 (A8)

Date of Survey: 6/15/04

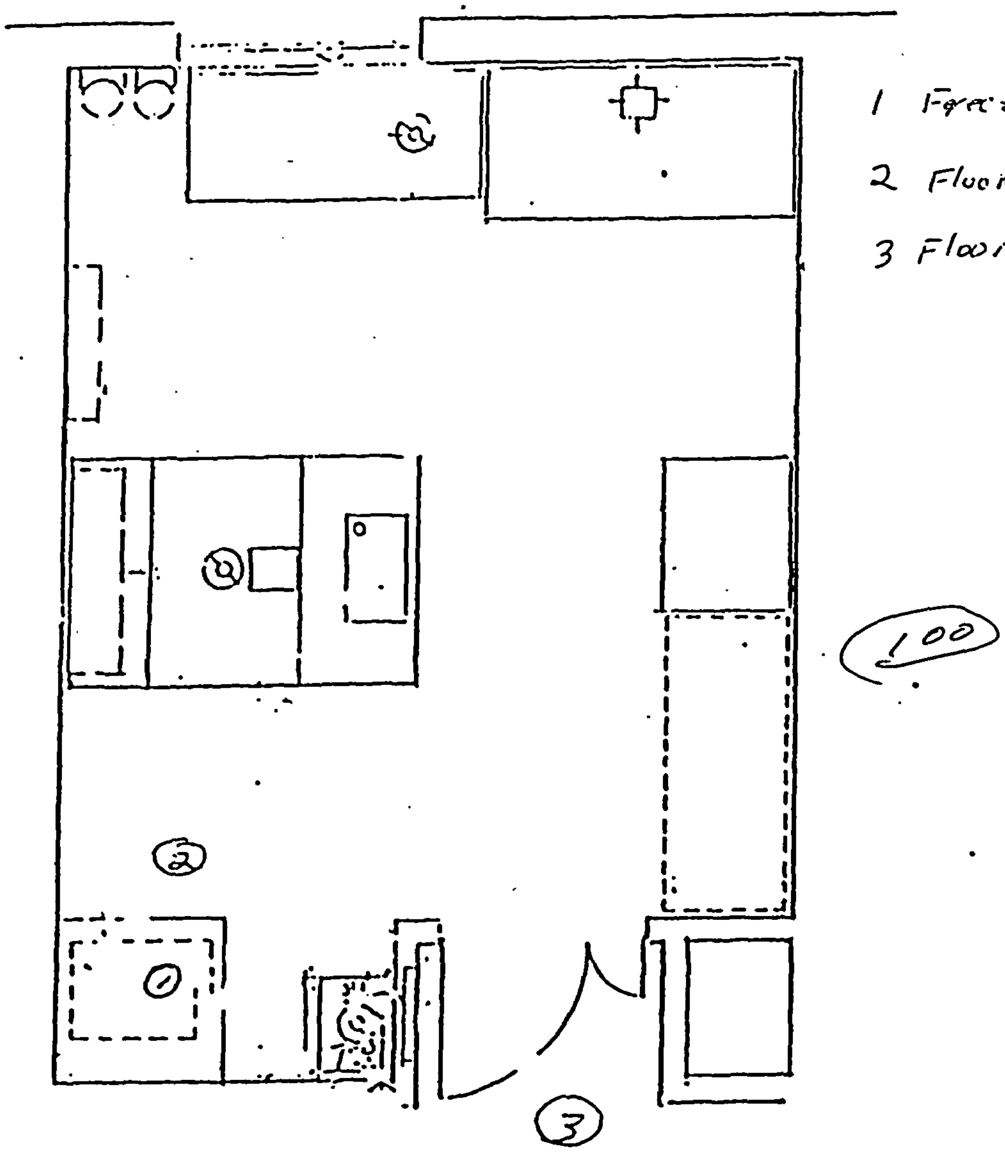
LLD = ~~6~~ 12.4 Net DPM = ~~2.7~~ 5.6 x10 $^{-6}$ = 0.21 Be Q

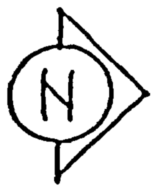
Surveyor: B²

RSO Signature: [signature]

Dec 1999

	Net DPM	BcQ
1 Freezer	2.6	<LLD
2 Floor	5.1	<LLD
3 Floor	1.9	<LLD





Radiation Instrument / L108 (A8)

Date of Survey: 12/8/99

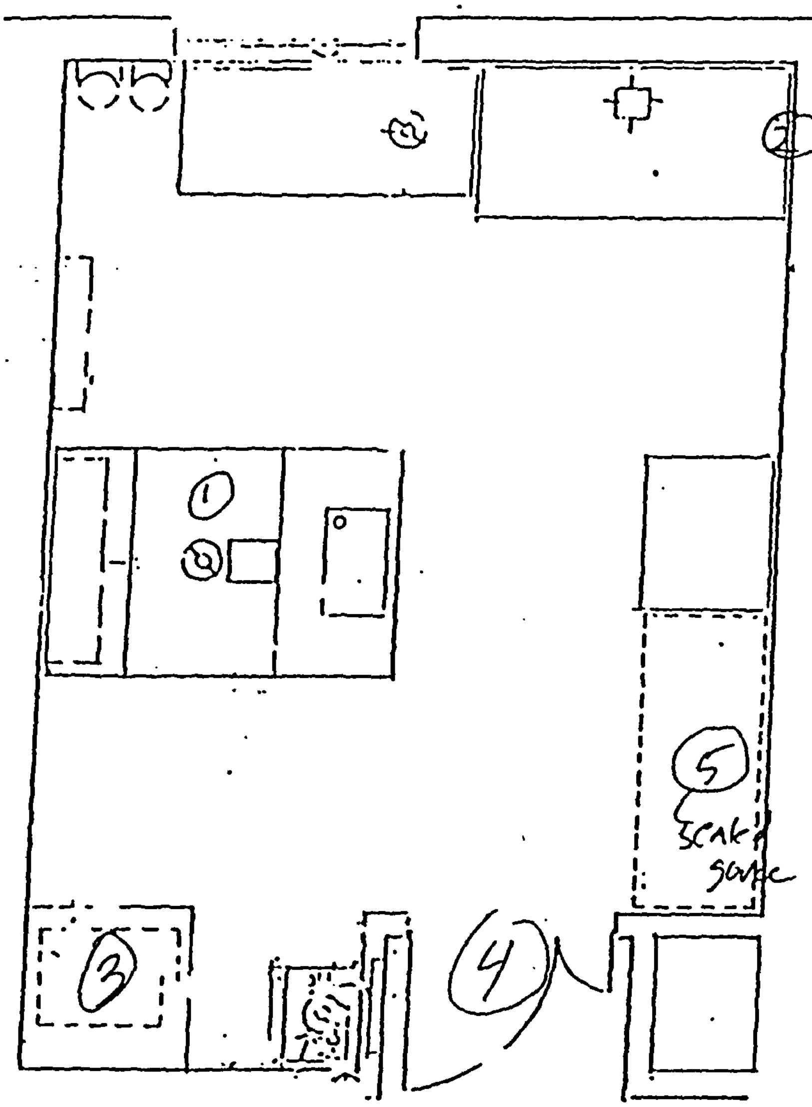
Surveyor: B2

RSO Signature: [signature]

LLD = ~~6~~ 5.4 Net DPM = 2.4 x 10^{-6} µCi

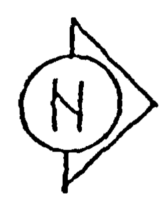
0.090 BcQ

Sealed Source # Halls & Disposal Areas



	Net DPM	BeQ
1	0.05	<LLD
2	0.00	<LLD
3	23.5	0.392
4	2.33	<LLD
5	1.64	<LLD (Sealed Source)

PRINT OUT 89



Radiation Instrument / L108 (A8)

Date of Survey: 1/14/99

LLD = ~~6~~ 5.6 Net DPM = ~~2.7x10^-6~~ 0.094 BeQ

Surveyor: B2

RSO Signature: [signature]

U.S. Environmental Protection Agency
Western Ecology Division

NRC Radioactive Materials License No. 36-12343-02 Termination and Facility Decommissioning

Date: **November 27, 2004**
Subject: **Room Survey: Newport L-123 Final Contamination Survey.**

Description and Historic Use:

Double lab (450 ft^2). Carbon-14 tracers.

Surveys:

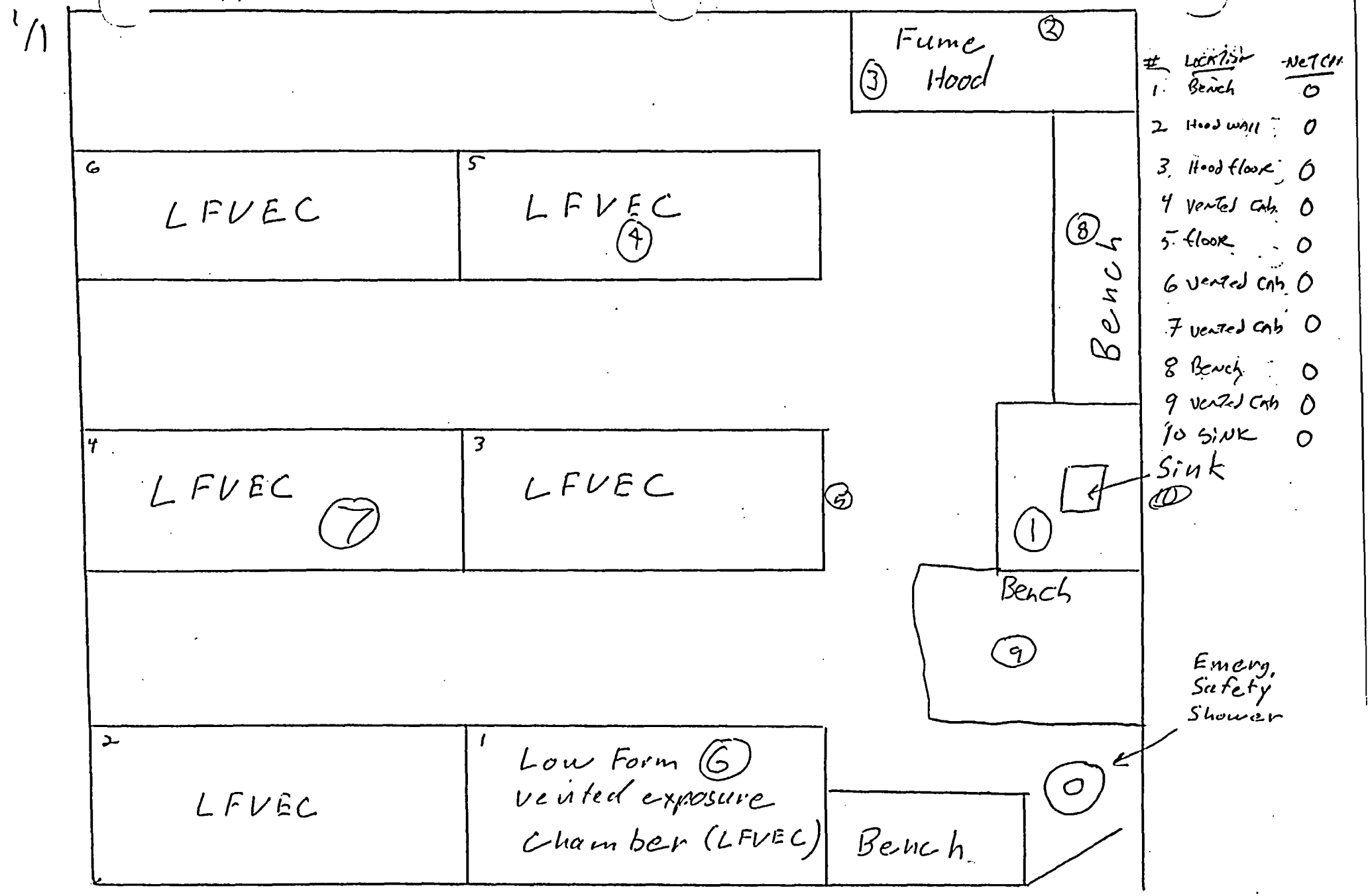
Total (fixed + removable) and removable contamination surveys were conducted in L-123 in June 2004.

All points surveyed (10 total and 28 removable) demonstrated no contamination. This area meets the contamination criteria for unrestricted use based upon the isotopes used at our facilities. A HVAC duct swipe was made in June 2004 which detected no contamination.

Records for this room clearly demonstrate that contamination surveys were regularly performed, the area was not subject to any significant contamination events, and the room was maintained as a contaminate-free area. We determined it was unnecessary to conduct further contamination surveys in this area given these survey results and the Western Ecology Division's historic management of radioactive material use in this area.

The survey for total contamination was conducted using a Technical Associates TBM-3 G-M Survey Meter equipped with a 20 cm^2 thin-window. Removable contamination swipes were counted in a Packard 2000 CA dual channel Liquid Scintillation Counter.

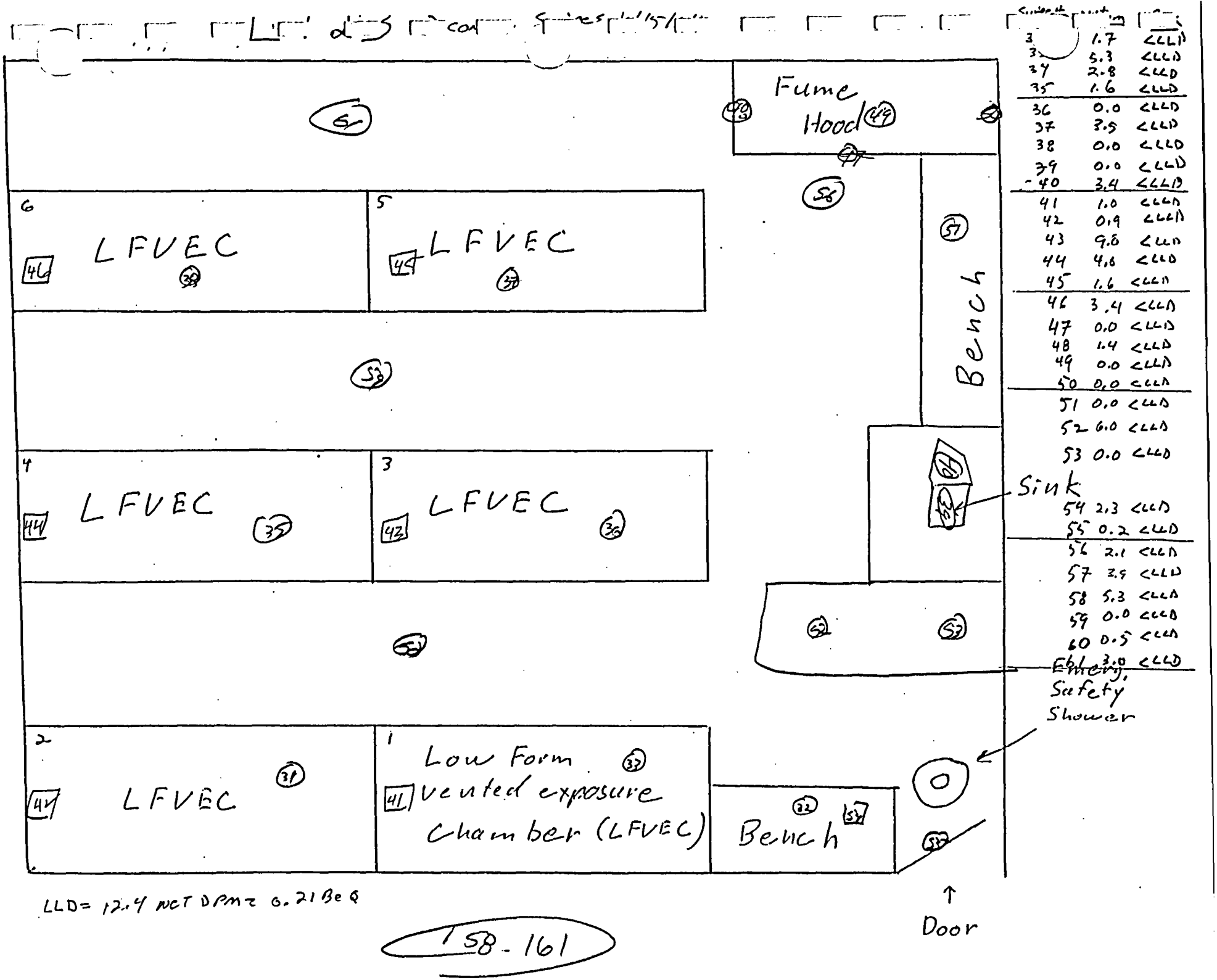
1/1



#	Location	NetCPM
1	Bench	0
2	Hood wall	0
3	Hood floor	0
4	Vented Cab.	0
5	floor	0
6	Vented Cab	0
7	Vented Cab	0
8	Bench	0
9	Vented Cab	0
10	SINK	0

Bkg ≅ 150 MAX CPM

Bernd Grau 6/23/09



Sample #	count	
3	1.7	<LLD
3	5.3	<LLD
34	2.8	<LLD
35	1.6	<LLD
36	0.0	<LLD
37	3.5	<LLD
38	0.0	<LLD
39	0.0	<LLD
40	3.4	<LLD
41	1.0	<LLD
42	0.9	<LLD
43	9.8	<LLD
44	4.8	<LLD
45	1.6	<LLD
46	3.4	<LLD
47	0.0	<LLD
48	1.4	<LLD
49	0.0	<LLD
50	0.0	<LLD
51	0.0	<LLD
52	6.0	<LLD
53	0.0	<LLD
54	2.3	<LLD
55	0.2	<LLD
56	2.1	<LLD
57	3.9	<LLD
58	5.3	<LLD
59	0.0	<LLD
60	0.5	<LLD
Ebl	3.0	<LLD

LLD = 12.4 net DPM = 0.21 Bq

158-161

U.S. Environmental Protection Agency
Western Ecology Division

NRC Radioactive Materials License No. 36-12343-02 Termination and Facility Decommissioning

Date: **November 27, 2004**
Subject: **Room Survey: Newport S-118 Final Contamination Survey.**

Description and Historic Use:

Double lab (250 ft^2). Carbon-14 tracer.

Surveys:

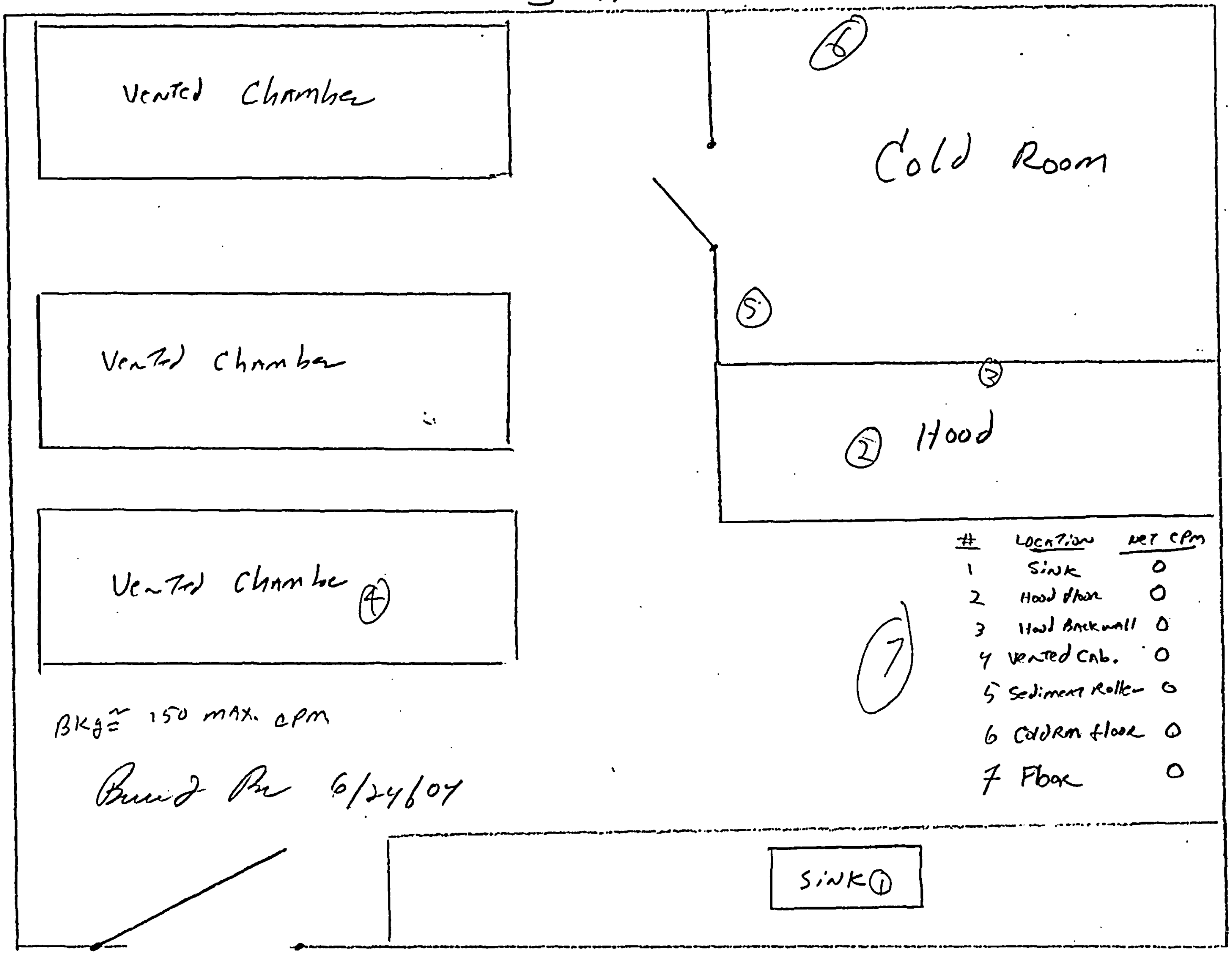
Total (fixed + removable) and removable contamination surveys were conducted in L-118 in June 2004.

All points surveyed (7 total and 30 removable) demonstrated no contamination. This area meets the contamination criteria for unrestricted use based upon the isotopes used at our facilities. A HVAC duct swipe was made in June 2004 which detected no contamination.

Records for this room clearly demonstrate that contamination surveys were regularly performed, the area was not subject to any significant contamination events, and the room was maintained as a contaminate-free area. We determined it was unnecessary to conduct further contamination surveys in this area given these survey results and the Western Ecology Division's historic management of radioactive material use in this area. Records of the most recent historic surveys (i.e. prior to the final decommissioning surveys) of S-118 are included in this report.

The survey for total contamination was conducted using a Technical Associates TBM-3 G-M Survey Meter equipped with a 20 cm^2 thin-window. Removable contamination swipes were counted in a Packard 2000 CA dual channel Liquid Scintillation Counter.

S-118: Fixed Contam



#	Location	Net cpm
1	Sink	0
2	Hood floor	0
3	Hood Backwall	0
4	Vented Cab.	0
5	Sediment Roller	0
6	ColdRm floor	0
7	Floor	0

RADIATION CENTER

OREGON STATE UNIVERSITY
Instrument Calibration Facility
100 Radiation Center, Corvallis, Oregon 97331-5903
Telephone 541-737-7055 Fax 541-737-0480

Enviromental Protection Agency Ludlum Model 2000 Scaler S/N 83810 9/8/2004

Scaler Check (Technical Associates pulser model PV-1 SN36207)

Settings (min.)	Applied Frequency (CPM)	Displayed Counts
10 X 0.1	500,000	499,913
10 X 1	50,000	499,942
01 X 10	50,000	499,930
05 X 1	10,000	49,994

High Voltage Check

Measured High Voltage (V)	Dial Setting	Displayed High Voltage (KV)
478	2.00	.5
982	4.00	1
1482	6.00	1.5
1979	8.00	2
2451	10.00	2.5

Instrument Check Performed By: _____
Steve Smith

RADIATION CENTER

OREGON STATE UNIVERSITY
Instrument Calibration Facility
100 Radiation Center, Corvallis, Oregon 97331-5903
Telephone 541-737-7055 Fax 541-737-0480

Organization: EPA-Corvallis -J. Gile Date: 9/8/2004

Instrument Data:

Manufacturer: Ludlum
Instrument Type: GM
Model: 3
Serial Number: 77176

Calibration Data:

Calibration Standard: Pulser PV1,36207

Scale/ Range	1/3 Scale Applied (CPM)	1/3 Scale Inst. Reading (CPM)	2/3 Scale Applied (CPM)	2/3 Scale Inst. Reading (CPM)
X.1	200	200	400	400
X1	2,000	2,000	4,000	4,000
X10	20,000	20,000	40,000	40,000
X100	200,000	200,000	400,000	400,000

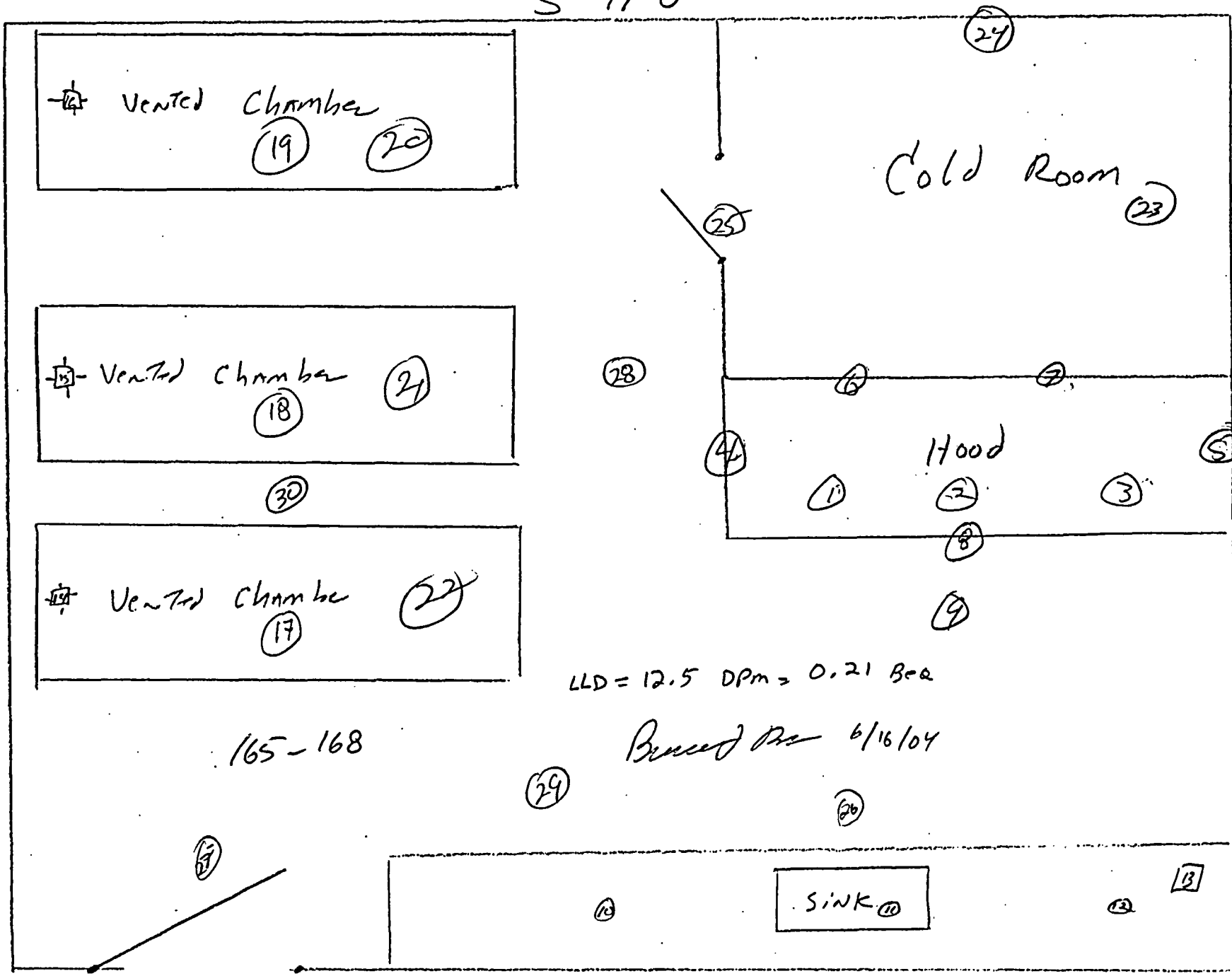
Instrument reads 3000 CPM @ 1mR/hr with Ra-226

Source	Source Activity (DPM)	Instrument Response (CPM)	Yield (%)
C-14	188,556	2,000	1.1
Tc-99	69,259	10,000	14
Bi-210	21,294	6,000	28

Remarks

Calibrated By: _____
S. Smith

S-118



Samp #	Net DPm	Bq
1	7.9	<LLD
2	0.0	<LLD
3	4.5	<LLD
4	1.3	<LLD
5	4.1	<LLD
6	1.0	<LLD
7	0.0	<LLD
8	3.1	<LLD
9	0.0	<LLD
10	1.9	<LLD
11	0.0	<LLD
12	2.7	<LLD
13	0.5	<LLD
14	0.7	<LLD
15	0.0	<LLD
16	0.0	<LLD
17	2.1	<LLD
18	0.0	<LLD
19	1.2	<LLD
20	0.0	<LLD
21	0.0	<LLD
22	0.0	<LLD
23	3.1	<LLD
24	0.0	<LLD
25	0.0	<LLD
26	1.1	<LLD
27	2.5	<LLD
28	0.0	<LLD
29	0.0	<LLD
30	6.2	<LLD

SCINTILLATION COUNTER DATA SHEET page 1 of 4

Sampler's Init:
Sample desc: C-14 S-118 Decon Swipes

Machine Q.A.
Background CPM: 18.3
Reference Standard: 97 %
Operator Initial: BV

Sample Control
Collected: 6/16
Received: 6/16
Analyzed: 6/16
Returned P.I.:

PROT #	SAMPLE #	SLOT#	SAMPLE VOLUME	SAMPLE SOLVENT	FLUOR VOLUME	FLUOR TYPE	DPM/CPM	REMARKS
	NA	1	NA	swipe	18ml	Ultima Gold	267	BLANK
	1	2					306	Hood floor
	2	3					248	" "
	3	4					✓ 314.2	" "
	4	5					✓ 280	Hood side wall
	5	6					✓ 308	" " "
	6	7					✓ 277	Hood back wall
	7	8					✓ 254	" " "
	8	9					✓ 298	Hood Lip
	9	10					✓ 224	floor @ Hood
	10	11					✓ 286	Counter top
	11	12					✓ 244	sink
	12	13					294	Counter top
	13	14					✓ 243	Phone
	14	15					279	Vented Cabinet door 7
	15	16					226	" " "

SCINTILLATION COUNTER DATA SHEET page 2 of 4

Sampler's Init:
Sample desc: C-14 S-118 Decontam. Swipe

Machine Q.A.
Background CPM: 18.3
Reference Standard: 97 %
Operator Initial: B

Sample Control
Collected: 6/16
Received: 6/16
Analyzed: 6/16
Returned P.I.:

PROT #	SAMPLE #	SLOT#	SAMPLE VOLUME	SAMPLE SOLVENT	FLUOR VOLUME	FLUOR TYPE	DPM/CPM	REMARKS
	16	17	NA	Swipe	18	ULTIMA GOLD	232.6	UNUSED CONTROL VIAL
	17	18					288.8	inside CABINET
	18	19					257	" "
	19	20					279	" "
	20	21					247	OUTSIDE MOUNTED CAL
	21	22					235	" " "
	22	23					258	" " "
	23	24					297	COLD ROOM FLOOR
	24	25					244	" " WALL
	25	26					261	" " "
	26	27					278	FLOOR @ SINK
	27	28					299	FLOOR @ DOOR
	28	29					257	FLOOR
	29	30					258	FLOOR
	30	31					329	FLOOR

U.S. Environmental Protection Agency
Western Ecology Division

NRC Radioactive Materials License No. 36-12343-02 Termination and Facility Decommissioning

Date: **November 27, 2004**
Subject: **Room Survey: Newport Waste Storage Final Contamination Survey.**

Description and Historic Use:

Separate building (250 ft^2). Hydrogen-3 and carbon-14 tracers.

Surveys:

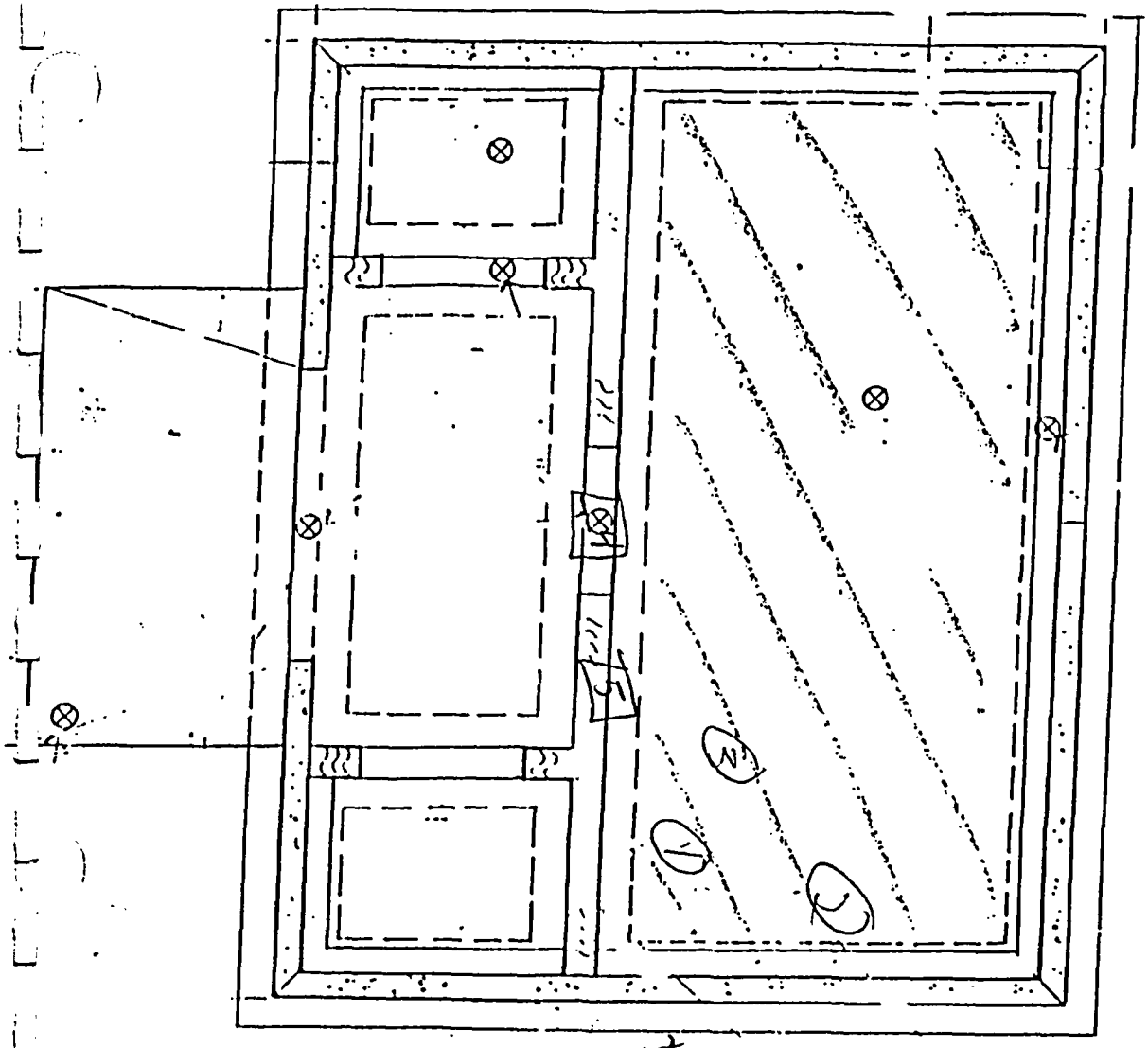
Total (fixed + removable) and removable contamination surveys were conducted in the Hazardous Waste building in June 2004.

All points surveyed (5 total and 10 removable) demonstrated no contamination. This area meets the contamination criteria for unrestricted use based upon the isotopes used at our facilities. A HVAC duct swipe was made in June 2004 which detected no contamination.

Records for this room clearly demonstrate that contamination surveys were regularly performed, the area was not subject to any significant contamination events, and the room was maintained as a contaminate-free area. We determined it was unnecessary to conduct further contamination surveys in this area given these survey results and the Western Ecology Division's historic management of radioactive material use in this area. Records of the most recent historic surveys (i.e. prior to the final decommissioning surveys) of the Hazardous Waste storage are included in this report.

The survey for total contamination was conducted using a Technical Associates TBM-3 G-M Survey Meter equipped with a 20 cm^2 thin-window. Removable contamination swipes were counted in a Packard 2000 CA dual channel Liquid Scintillation Counter.

WASTE STORAGE : FIXED CONTAM: SURVEY MC 2L



#	Location	Net CPM
1	WALL	0
2	WALL	0
3	floor	0
4	VENT	0
5	DOOR	0

Bkg ≅ 150 MAX CPM

~~LLD = 6 Net CPM~~

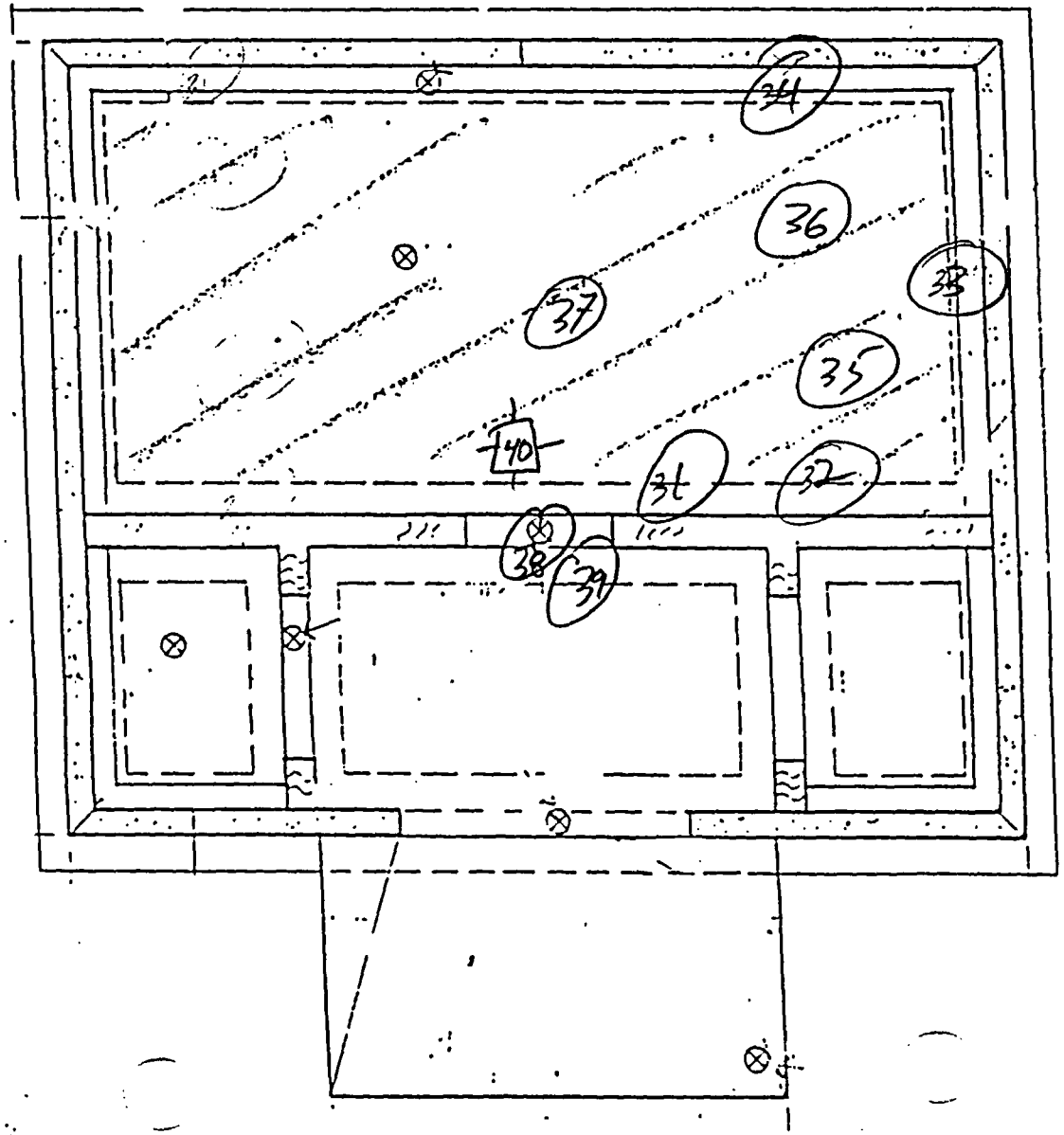
Date of Survey: 6/23

Surveyor: BJ2

RSO Signature: Bruce Rec

WASTE STORAGE

Decomm. Swidg



Sample #	Net DPM	BeQ
31	0.7	<LLD
32	0.0	<LLD
33	1.6	<LLD
34	0.0	<LLD
35	9.6	<LLD
36	0.0	<LLD
37	0.0	<LLD
38	1.4	<LLD
39	2.6	<LLD
40	0.0	<LLD

165 - 168

LLD = ~~8~~ 12.5 Net DPM = $\frac{5.6}{2.7} * 10^{-6} \cong 0.2$

Date of Survey: 6/16

Surveyor: [illegible]

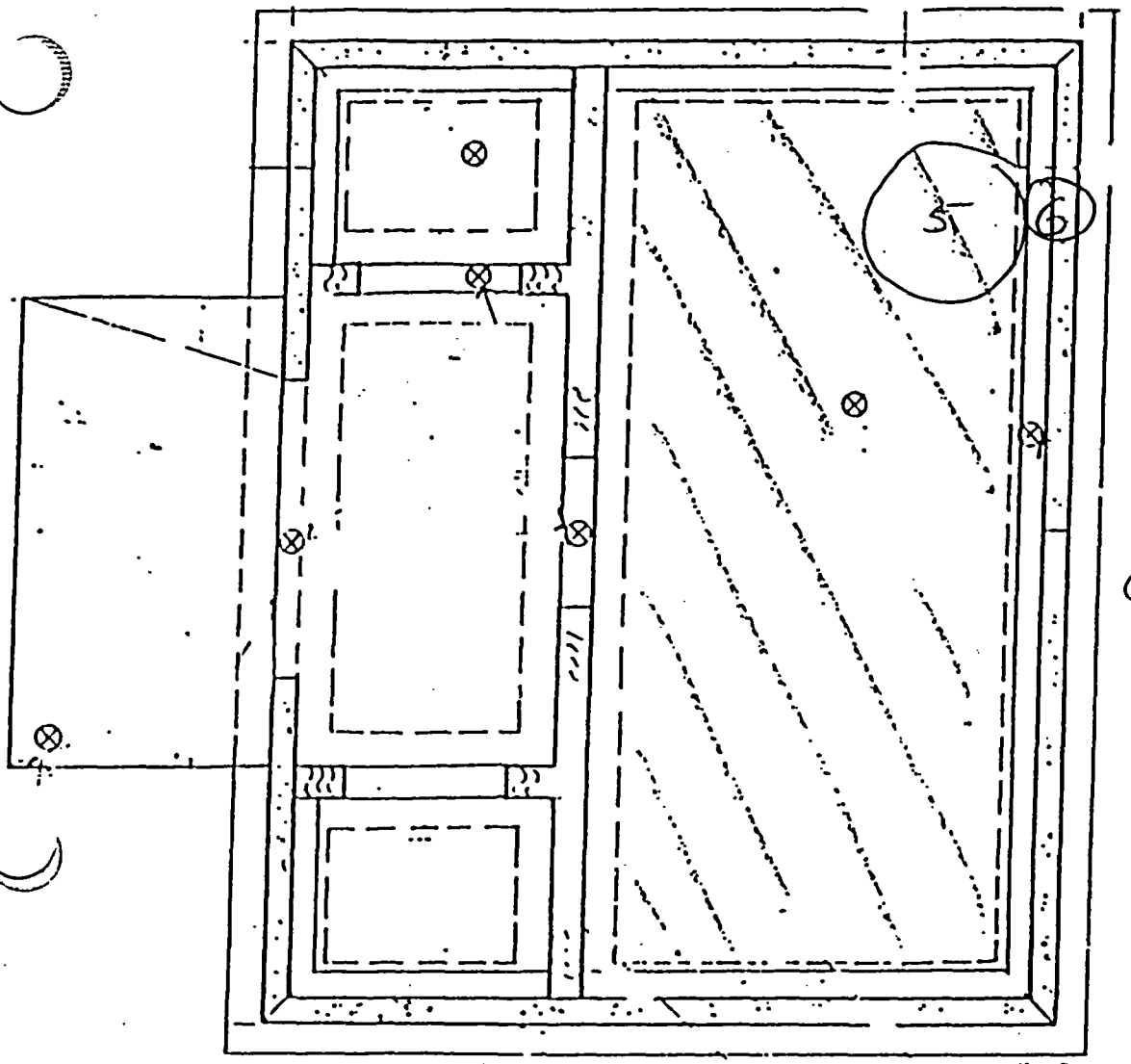
RSO Signature: [illegible]

SCINTILLATION COUNTER DATA SHEET page 3 of 4

Sampler's Init:	Machine Q.A.	Sample Control
Sample desc: C-14 HAZ WASTE ROOM Decontm. Swipes	Background CPM: 10.3	Collected: 6/16
	Reference Standard: 97 %	Received: 6/16
		Analyzed: 6/16
	Operator Initial: JS	Returned P.I.:

PROT #	SAMPLE #	SLOT#	SAMPLE VOLUME	SAMPLE SOLVENT	FLUOR VOLUME	FLUOR TYPE	DPM/CPM	REMARKS
	31	32	NA	SWIPE	18 m-e	ULTIMA GOLD	2274	WALL
	32	33					2259	"
	33	34					2283	"
	34	35					2251	"
	35	36					3663	FLOOR
	36	37					2240	"
	37	38					2264	"
	38	39					2281	LAB WOB
	37	40					2293	FLOOR @ DOOR
	40	41					2265	VENT

Dec 1999



WASTE STORAGE

	Net DPM	BeQ
5 Top of waste Barrel =	11.5	< LLD
6 wall Behind Barrel =	5.0	< LLD

Date of Survey: 12/8/99

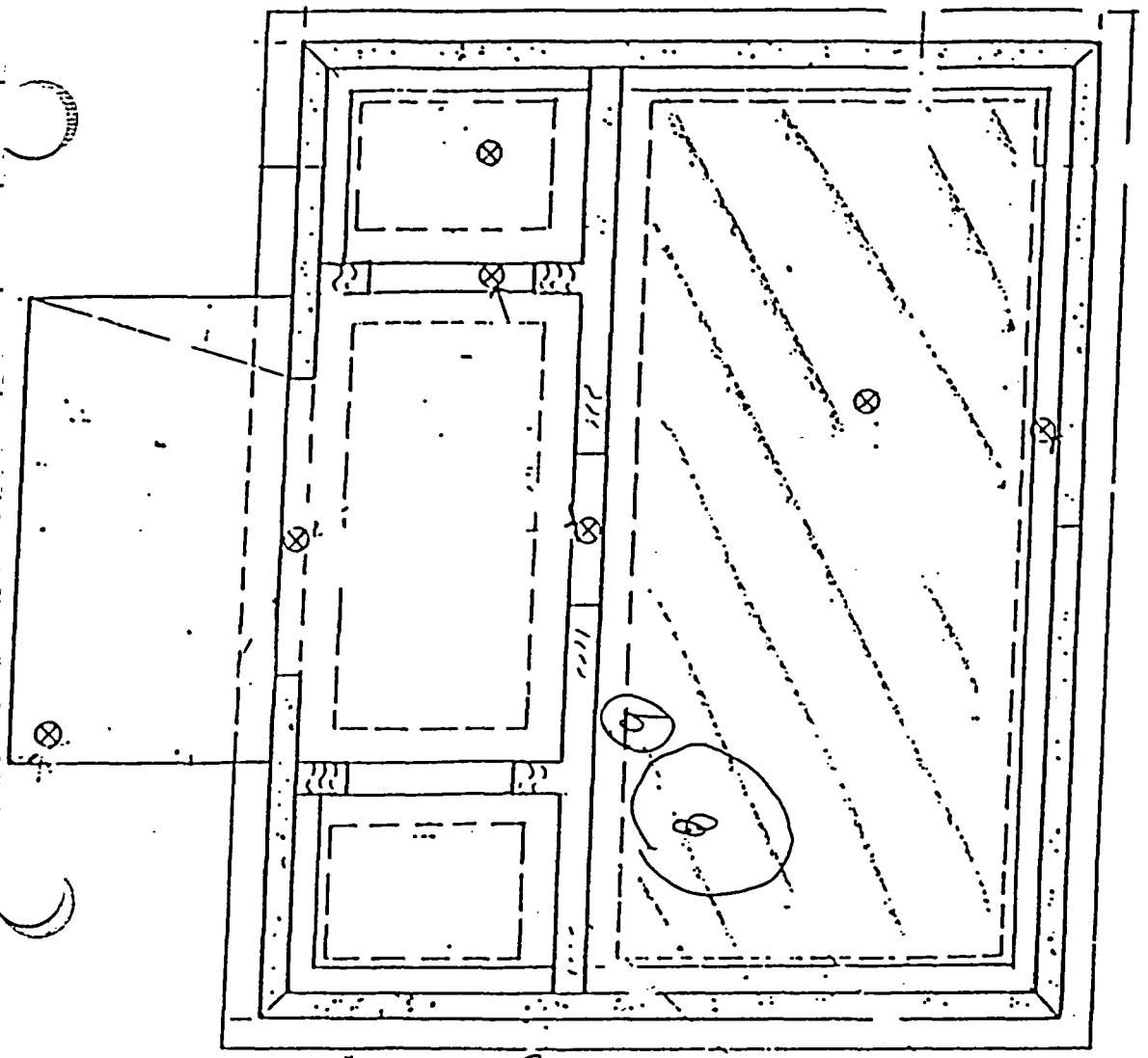
Surveyor: RV

RSO Signature: [signature]

LLD = ~~6~~ 5.4 Net DPM = 2.7/4 × 10^{-6}

= 0.090 Bq

June 97



Waste Storage

	Net DPM	Beq
8	0.0	(LLD)
9	0.0	(LLD)

(93)

Date of Survey: 6/22/95

Surveyor: BR

RSO Signature: Bruce J Rae

LLD = ~~6~~ 5.3 Net DPM = ~~2.7×10^{-6}~~ 0.087 Beq

U.S. Environmental Protection Agency
Western Ecology Division

NRC Radioactive Materials License No. 36-12343-02 Termination and Facility Decommissioning

Date: **November 27, 2004**
Subject: **Room Survey: Newport Facility Unrestricted Areas Final Contamination Surveys.**

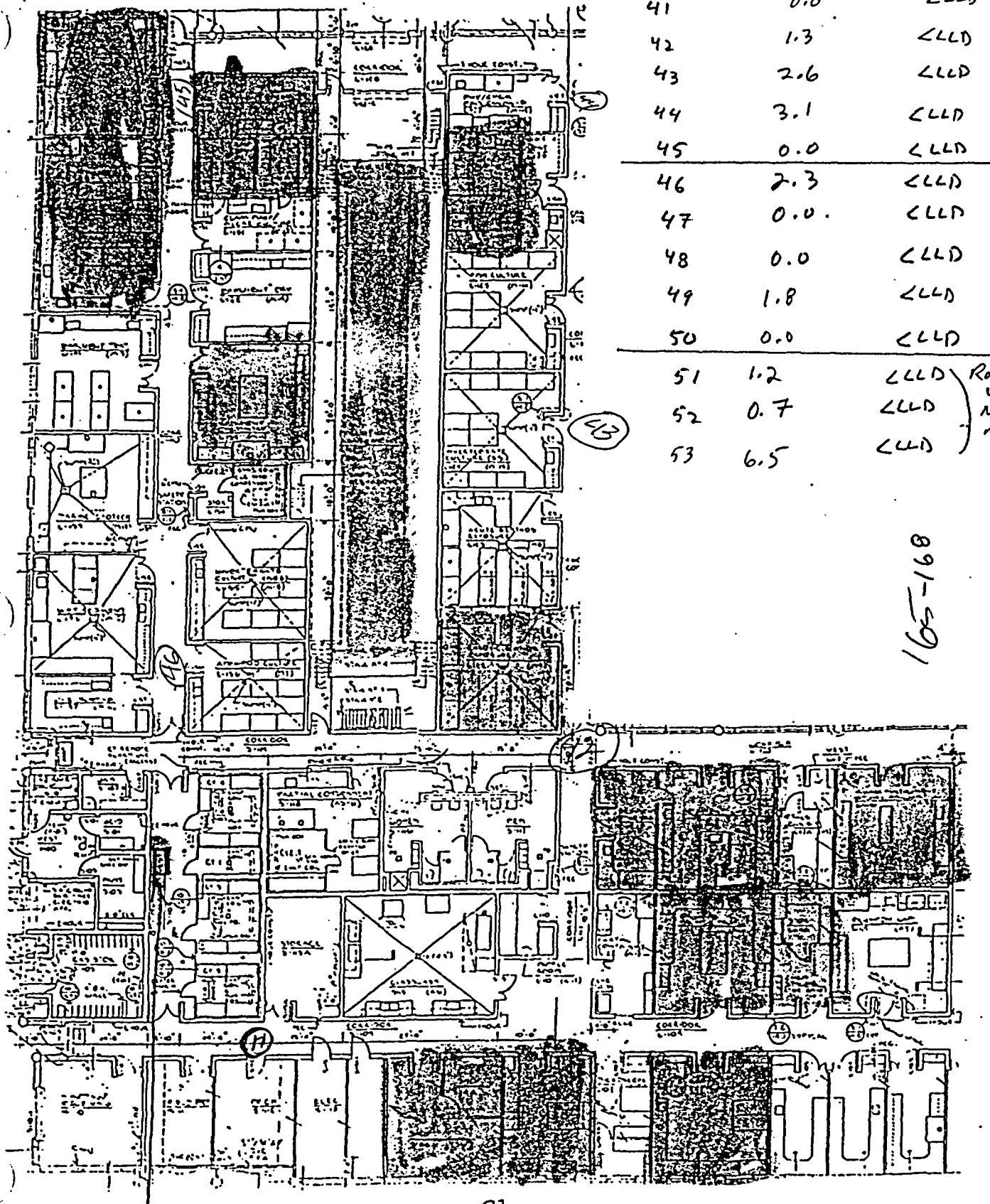
Ten areas of the Newport facility were surveyed for removable contamination. Areas surveyed included seven hallways. All areas surveyed indicated no contamination. These areas meet the contamination criteria for unrestricted use based upon the isotopes used at our facilities.

We considered it adequate to limit the survey of unrestricted areas to these fourteen locations because of the historic use of radioactive materials at our facilities. Records clearly demonstrate that contamination surveys were regularly performed and that unrestricted areas were never contaminated. These records also demonstrate that there were never any significant contamination events and the restricted areas were maintained as contaminate-free areas. We determined it was unnecessary to conduct further contamination surveys in these areas and other unrestricted areas of our facilities given these survey results and the Western Ecology Division's historic management of radioactive materials.

The survey for total contamination was conducted using a Technical Associates TBM-3 G-M Survey Meter equipped with a 20 cm^2 thin-window. Removable contamination swipes were counted in a Packard 2000 CA dual channel Liquid Scintillation Counter.

Decomm. Swine

Laboratory Wing Floor Plan



Sample#	Net DPM	BeQ	
41	0.0	<LLD	
42	1.3	<LLD	
43	2.6	<LLD	
44	3.1	<LLD	
45	0.0	<LLD	
46	2.3	<LLD	
47	0.0	<LLD	
48	0.0	<LLD	
49	1.8	<LLD	
50	0.0	<LLD	
51	1.2	<LLD	Roof Hood Vents. No MAP
52	0.7	<LLD	
53	6.5	<LLD	

89-169

C1

-80°C Freezer

LLD = 12.5 DPM = 0.21 BeQ

Brian J Bar 6/12/09

Sampler's Init:
Sample desc: C-14 Hall ways + -80 freezer
Decomm. Swipes

Machine Q.A.

Background CPM: 18.3
Reference Standard: 97%
Operator Initial: [illegible]

Sample Control

Collected: 6/16
Received: 6/16
Analyzed: 6/16
Returned P.I.:

PROT #	SAMPLE #	SLOT#	SAMPLE VOLUME	SAMPLE SOLVENT	FLUOR VOLUME	FLUOR TYPE	DPM/CPM	REMARKS
	41	42	NA	Swipe	18ml	Ultima Gold	24.4	floor outside L108
	42	43					28.0	floor @ Door to wet lab
	43	44					29.3	floor @ L1[illegible]
	44	45					29.8	" " L156
	45	46					24.3	" " L143
	46	47					29.0	" " L1[illegible]
	47	48					23.6	" " S118
	48	49					24.4	-80 Freezer Top
	49	50					28.5	" " inside lid
	50	51					20.9	" " inside wall
	51	52					27.9	S118 Ducting on Roof
	52	53					27.4	L108 Roof Ducting
	53	54					33.2	L123 Roof Ducting

U.S. Environmental Protection Agency
Western Ecology Division

NRC Radioactive Materials License No. 36-12343-02 Termination and Facility Decommissioning

Date: **November 27, 2004**
Subject: **Room Survey: Plant Ecology Building (Wildlife/Wildlife Research Facility) 115 and 118 Final Contamination Survey.**

Description and Historic Use:

Single exposure rooms (225 ft^2). Hydrogen-3 tracer study. These rooms were decommissioned as an unrestricted area on November 1988. No isotope use since 1988.

Surveys:

A removable contamination survey was conducted in PEB (WLD) 115 and 118 at the time of restricted use decommissioning. The decommissioning records are enclosed. All points in the final surveyed demonstrated no significant contamination. This area meets the contamination criteria for unrestricted use based upon the isotopes used at our facilities. HVAC duct swipes were made at the time of decommissioning which indicated minor contamination of the exhaust plenum in the room (10 –16 Bq/100 cm^2).

Records for this room clearly demonstrate that contamination surveys were regularly performed, the area was not subject to any significant contamination events, and the room was maintained as a contaminate-free area. We determined it was unnecessary to conduct further contamination surveys in this area given these survey results and the Western Ecology Division's historic management of radioactive material use in this area. Records of the most recent historic surveys (i.e. prior to the final decommissioning surveys) of PEB (WLD) 115 and 118 are included in this report.

Removable contamination was determined using methanol-wetted swipes counted in a Packard 2200 CA dual channel Liquid Scintillation Counter.

88-43

AREA CONTAMINATION SURVEY SHEET

WLD BaP Study

Radionuclide(s) Surveyed: 3H Date: 11-21-88

Method of Detection: LSC

P A. Mann
Radiation Safety Technician

Swipe #	Location RM #	Area	Nuclide: NET CPM	NET DPM	µCi	Nuclide: NET CPM	NET DPM	µCi
1		Bkgrd	17	49				
2	15 WLD	Floor	2	< LLD95				
3	↓	Floor	2	↓				
4		Floor	3					
5		Floor	0					
6		Floor	0					
7		Floor	5					
8		Floor	0					
9	↓	Floor	1	↓				
		STD 50 dpm	27	42				
		STD 400 "	203	404				
		STD 40K "	12223	37,393				

Calculation of Lower Limits of Detection (LLD)

	Nuclide: 3H	Nuclide:
Gross Background Counts:	51	
Total Background Count time:	3	

$$(95\%) = \sqrt{\frac{\text{Gross Background Counts}}{\text{Count Time}}} \times 4.66$$

LLD (95%)=	10	

REMARKS:

88-42

AREA CONTAMINATION SURVEY SHEET

Radionuclide(s) Surveyed: ^3H Date: 11-17-88

Method of Detection: LSC

D.A. Monar
Radiation Safety Technician

Swipe #	Location RM #	Area	Nuclide: NET CPM	NET DPM	µCi	Nuclide: NET CPM	NET DPM	µCi
3	W015	B	16	44				
4		B	13 $\bar{x}=15$	35 $\bar{x}=40.$				
5		Scissors	5	< LLD_{95}				
6		Scissors	0					
7		Scissors	4					
8		Scissors	0					
9		Forceps	0					
10		Forceps	1653	1778	Reclean/reswipe			
11		forceps	0	< LLD_{95}				
12 → 13		syringes beaker	5 0					
14		beaker	5					
15		tube	10	28				
16		bottle	0	< LLD_{95}				
17		bottle	3					
18		Counter	2					

Calculation of Lower Limits of Detection (LLD) Nuclide: _____ Nuclide: _____

Gross Background Counts: _____ _____

Total Background Count time: _____ _____

LLD (95%)= $\sqrt{\frac{\text{Gross Background Counts}}{\text{Count Time}}}$ x 4.66

LLD (95%)= _____ _____

REMARKS:

AREA CONTAMINATION SURVEY SHEET

Radionuclide(s) Surveyed:_____ Date:_____

Method of Detection:_____

Radiation Safety Technician

Swipe #	Location RM #	Area	Nuclide: NET CPM	NET DPM	µCi	Nuclide: NET CPM	NET DPM	µCi	
19		Counter	0	<4.95					
		door	5						
		floor	0						
		floor	0						
		hood	4						
		hood	0						
		phone	0						
		N Counter	0						
		N Counter	1						
		N Sink	0						
		N Sink	0	↓					
		STD 50 dpm	24	39					
		STD 410 dpm.	194	391					

Calculation of Lower Limits of Detection (LLD)

	Nuclide: ^3H	Nuclide:
Gross Background Counts:	45	
Total Background Count time:	3	

$$LLD\ (95\%) = \frac{\sqrt{\text{Gross Background Counts}}}{\text{Count Time}} \times 4.66$$

LLD (95%)=	10	

REMARKS:

AREA CONTAMINATION SURVEY SHEET

BAP WLD Air monitoring

Radionuclide(s) Surveyed: ^{3}H Date: 11-16-88

Method of Detection: LSC P. Monaco

use 16cpm, ~~35~~ 37 dpm Radiation Safety Technician

Sample # Swipe #	Location RM #	Area	Nuclide: NET CPM	NET DPM	µCi	Nuclide: NET CPM	NET DPM	µCi	
1		Bkgrd / ~~Toluene~~ hexane	14	32					
2		Bkgrd	14	32					
3		PRE-Filter L	14 / 16	33 / 37					
~~5~~ 4		PRE-Filter H	~~#~~ 18 / 15	~~37~~ 43 / 36					
~~7~~ 5		PRE-L XAD-100	1	<					
6		PRE-H XAD 100	0	<					
~~9~~ 7		PRE-L XAD-50	1	<					
8		PRE-H XAD-50	4	<					
15		T_0-L Filter	0	<					
~~17~~ 10		T_0-H Filter	0 1	<					
19		T_0-L XAD-100	0 1	<					
~~21~~ 12		T_0-H XAD 100	2	<					
~~23~~ 13		T_0-L XAD 50	2	<					
~~25~~ 14		T_0-H XAD 50	0 2	10 <					

Calculation of Lower Limits of Detection (LLD) Nuclide: _____ Nuclide: _____

Gross Background Counts: 140 _____

Total Background Count time: 10 _____

$$\text{LLD (95\%)} = \sqrt{\frac{\text{Gross Background Counts}}{\text{Count Time}}} \times 4.66$$

LLD (95%)= 6 _____

REMARKS:

AREA CONTAMINATION SURVEY SHEET

Radionuclide(s) Surveyed:_____ Date:_____

Method of Detection:_____

_____
Radiation Safety Technician

Swipe #	Location RM #	Area	Nuclide: NET CPM	NET DPM	µCi	Nuclide: NET CPM	NET DPM	µCi
27/15		T_{12} -L Filter	3 0	< LLD				
29/16		T_{12} - H Filter	4 2	<				
31/17		T_{12} -L XAD-100	1	<				
33/18		T_{12}-H XAD-100	3 4	V				
35/19		T_{12} - L XAD-50	4 4					
37/20		T_{12} - H XAD-50	4 0					
39/21		T_{24} - L Filter	2 1					
41/22		T_{24} - H Filter	0					
43/23		T_{24} - L XAD-100	3 2					
45/24		T_{24} - H XAD-100	2 3					
47/25		T_{24} - L XAD-50	1 2					
49/26		T_{24} - H XAD-50	2 2					
51		T_{36} -L Filter	1 4					
53		T_{36} - H Filter	3 2	✓				

Calculation of Lower Limits of Detection (LLD) Nuclide:_____ Nuclide:_____

Gross Background Counts: _____ _____
Total Background Count time: _____ _____

$$\text{LLD (95\%)} = \sqrt{\frac{\text{Gross Background Counts}}{\text{Count Time}}} \times 4.66$$

LLD (95%)= _____ _____

REMARKS:

AREA CONTAMINATION SURVEY SHEET

Radionuclide(s) Surveyed: _____ Date: _____

Method of Detection: _____

_____
Radiation Safety Technician

Swipe #	Location RM #	Area	Nuclide: NET CPM	NET DPM	µCi	Nuclide: NET CPM	NET DPM	µCi	
55		T_{36}-L XAD-100	1 3	< LLD 95					
57		T_{36}-H XAD-100	2 1						
59		T_{36}-L XAD-50	2 2						
61		T_{36}-H XAD-50	3 1						
63		T_{48}-L Filter	2 3						
65		T_{48}-H Filter	1 2						
67		T_{48}-L XAD-100	4 5						
69		T_{48}-H XAD-100	1 4						
71		T_{48}-L XAD-50	5 0						
73		T_{48}-H XAD 50	2 0						
75		Spike Filter 1400 dpm	34 33	73 68 > 71	x5	400			
77		Spike Filter 1400 dpm	32 31	66 61 > 63	x5	315			
79		Spike XAD-100 1400 dpm	108 105	240 229 > 235	x5	1175	1175/1400 ± 100	90-78%	
81		Spike XAD-100 dpm	83 85	179 185 > 183	x5	925			
83		Spike XAD-50	1 3						

78-90% Recovery from XAD-

Calculation of Lower Limits of Detection (LLD) Nuclide: _____ Nuclide: _____

Gross Background Counts: _____ _____
Total Background Count time: _____ _____

$$\text{LLD (95\%)} = \sqrt{\frac{\text{Gross Background Counts}}{\text{Count Time}}} \times 4.66$$

LLD (95%)= _____ _____

REMARKS:

AREA CONTAMINATION SURVEY SHEET

Radionuclide(s) Surveyed:_____ Date:_____

Method of Detection:_____

_____
Radiation Safety Technician

Swipe #	Location RM #	Area	Nuclide: NET CPM	NET DPM	µCi	Nuclide: NET CPM	NET DPM	µCi	
	85	Spike XAD-2	2 1						
	87	BaP Dilution Sol	636 737	1293 1508					
	89	^{3}H STD 50 dpm	30	53					
	92	^{3}H STD 460 dpm	207	423					
	93	^{3}H STD 30k dpm	12193	37662					

Calculation of Lower Limits of Detection (LLD) Nuclide:_____ Nuclide:_____

Gross Background Counts: _____ _____
Total Background Count time: _____ _____

$$\text{LLD (95\%)} = \sqrt{\frac{\text{Gross Background Counts}}{\text{Count Time}}} \times 4.66$$

LLD (95%)= _____ _____

REMARKS:

88-37

AREA CONTAMINATION SURVEY SHEET

Radionuclide(s) Surveyed: ^{3}H Date: 11-9-88

Method of Detection: LSC 460

Radiation Safety Technician

Swipe #	Location RM #	Area	Nuclide: NET CPM	NET DPM	µCi	Nuclide: NET CPM	NET DPM	µCi	
1	1	Bkgrd-Pico	Gross 15	Gross 44					
2	190	Pump	0						
3		Timer	4	<					
4		Door handle	0						
5		Floor	0						
6		Bench	2	<					
WM	WLD 18	11-9-88 Dewar	0						
WM		11-9-88 Floor	0						
9		Bkgrd 20ml	Gross 12	Gross 31					
10	15	155 Bench	44	130					
11	15	Door Handle outside (Hall) ~~inside~~ room	10	31					
12	15	Door Handle inside ~~hall~~ side	13	41					
13	15	Hall Floor	5	<					
14	18	Hallway outside Rm 18	6	<					
15	18	Hall side door handle	0						

Calculation of Lower Limits of Detection (LLD)

	Nuclide: ^{3}H Pico	Nuclide:
Gross Background Counts:	45	34
Total Background Count time:	3	3

$$LLD\ (95\%) = \frac{\sqrt{\text{Gross Background Counts}}}{\text{Count Time}} \times 4.66$$

LLD (95%)=	10	9

REMARKS:

AREA CONTAMINATION SURVEY SHEET

Radionuclide(s) Surveyed:_____ Date:_____

Method of Detection:_____

_____
Radiation Safety Technician

Swipe #	Location RM #	Area	Nuclide: NET CPM	NET DPM	µCi	Nuclide: NET CPM	NET DPM	µCi
16	18	Door inside	6	<				
17	15	11-8-88 SS Bench	18	53				
18	15	Hall side Hall Door	4	<				
19	15	Door inside	2	<				
20	15	Floor	0					
21	18	Hall Floor	5	<				
22	18	Door Hall side	3	<				
23	18	Door inside	4	<				
		STD 50 dpm	26	48				
		STD 460 dpm	220	448				
		STD 41K dpm	~~3719~~ 12193	37600				

Calculation of Lower Limits of Detection (LLD) Nuclide:_____ Nuclide:_____

Gross Background Counts: _____ _____
Total Background Count time: _____ _____

$$LLD\ (95\%) = \sqrt{\frac{\text{Gross Background Counts}}{\text{Count Time}}} \times 4.66$$

LLD (95%)= _____ _____

REMARKS:

88-44

^3H BAP Study 11-7-88

AREA CONTAMINATION SURVEY SHEET

Radionuclide(s) Surveyed: ^3H Date: 11-7-88

Method of Detection: LSC 460 R. A. Moore
Radiation Safety Technician

Swipe #	Location RM # (132)	Area	Nuclide: ^3H NET CPM	NET DPM	µCi	Nuclide: NET CPM	NET DPM	µCi
1	136	BLANK	14	40				
2	136	Hood handles	2	< LLD				
3	"	W Floor	4	< LLD				
4	"	Wash Bottle	3	< LLD				
5	"	door handle	0					
6	"	E Floor	2	< LLD				
7	"	Hood Sill	93	281	NEED TO CLEAN & SWIPE			
8	WLD 18	outside DOOR handle	1	< LLD				
9	15	inside door handle	1	< LLD				
10	18	Inside door handle	0	?				
11	15	outside Door handle	0					
12	18	hall	0					
13	15	hall	0					
14	15	TABLE	0					
15	STD	46	30	50				
16		4LD	220	445				
17		41K	12314	33257				

WLD

Calculation of Lower Limits of Detection (LLD)

	Nuclide: ^3H	Nuclide:
Gross Background Counts:	42	
Total Background Count time:	3	

$$LLD\ (95\%) = \sqrt{\frac{\text{Gross Background Counts}}{\text{Count Time}}} \times 4.66$$

LLD (95%)=	10	

REMARKS: 2 counting cycles - confirmation

88-40

AREA CONTAMINATION SURVEY SHEET

BaP Post wash Swipes

11-17-88

Radionuclide(s) Surveyed: 3/1 Date: 1/2

Method of Detection: LSC

Radiation Safety Technician

1 Bkgnd. 22 cpm 60 dpm

Swipe #	Location RM #	Area	Nuclide: NET CPM	NET DPM	µCi	Nuclide: NET CPM	NET DPM	µCi
2	15	VENT opening Lt	0					
3		VENT opening Rt	0					
4		VENT Louver Lt	0					
5		VENT Louver Rt	212	600				
6		VENT. Box Lt	209	600				
7		VENT Box Rt	219	961				
8		Sensor	40	108				
9		Sensor	14	23				
10		door out	3	~~LLD~~				
11		HALL door inside	0					
12		hall door outside	0					
13		hall	0					
14		hall	0					
15		18' door hall side	0					
16		18' door	0					

Calculation of Lower Limits of Detection (LLD) Nuclide: ^{3}H Nuclide:

Gross Background Counts: 22

Total Background Count time: 3

$$LLD\ (95\%) = \frac{\sqrt{\text{Gross Background Counts}}}{\text{Count Time}} \times 4.66$$

LLD (95%)= 13

REMARKS:

AREA CONTAMINATION SURVEY SHEET

Radionuclide(s) Surveyed:_____ Date: 2/2

Method of Detection:_____

_____
Radiation Safety Technician

Swipe #	Location RM #	Location Area	Nuclide: NET CPM	NET DPM	µCi	Nuclide: NET CPM	NET DPM	µCi	
17	18	Floor	0						
18		Floor	0						
19		door out	0						
20		Dave hood	0						
21		Dave Belt	0						
22		Rick hood	0						
23		Rick Belt	0						
24	17	door outside	0						
25		door inside	0						
26	132	door	0						
27		light	0						
28		phone	0						
29		floor	0						
30		flor	0						
31		hood	20	162					

Calculation of Lower Limits of Detection (LLD) Nuclide:_____ Nuclide:_____

Gross Background Counts: 50dpm std gross 78.6
Total Background Count time: 410 dpm gross 472.

LLD (95%)= $\sqrt{\frac{\text{Gross Background Counts}}{\text{Count Time}}} \times 4.66$

LLD (95%)=

REMARKS:

P. Monaco

B&P air Monitoring 11-7-88.

	(A) Filter		(B) XAD 100mg		(C) XAD 50mg	
	L	H	L	H	L	H
PRE	1	2	3	4	5	6
T_0	7	8	9	10	11	12
T_{12}	13	14	15	16	17	18
T_{24}	19	20	21	22	23	24
T_{36}	25	26	27	28	29	30
T_{48}	31	32	33	34	35	36
Spikes	37	38	39	40	41	42

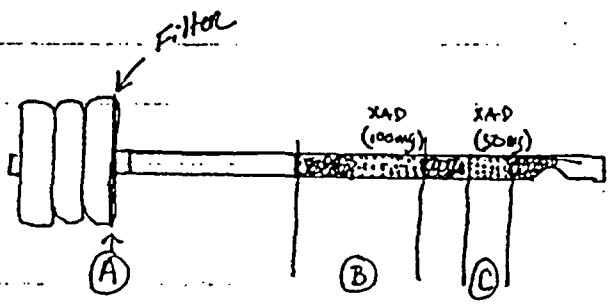
Filters, XAD (100 mg + glass plug) XAD (50 mg)

5 ml n-hexane (2x replicates)

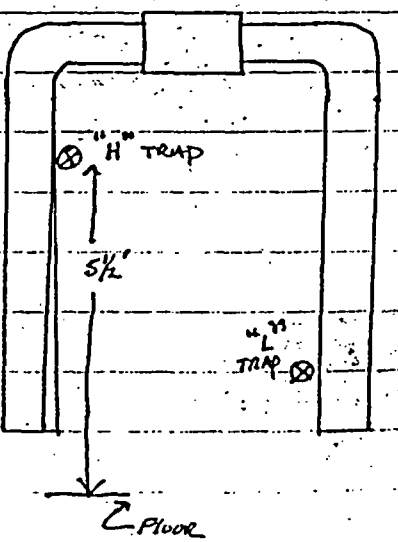
1 ml counted in Omniflow 10 min.

Spiked filter & XAD (B&P 3H 1400 dpm)

WLD 15 Ventillation



Filter + XAD-2 TRAP



88-36

WLD 15
Pre close

AREA CONTAMINATION SURVEY SHEET

Radionuclide(s) Surveyed: 3H Date: 10-21-88

Method of Detection: LSC 460

P A. Moore
Radiation Safety Technician

Swipe #	Location RM #	Area	Nuclide: NET CPM	NET DPM	µCi	Nuclide: NET CPM	NET DPM	µCi
1		Bkgecl	14	38				
2	WLD 15	Out Ventillation box	0					
3		Out Vent box	0					
4		Out Vent Box	0					
5		Out Vent Box - Temp Screen	0					
6		Out Vent Box - Door	0					
7		Out plenum at Base (left)	0					
8		Out plenum @ base (right)	0					
11	50 Std		22	38				
12	460 Std		197	392				
13	D 42K Std		12350	37389				

Calculation of Lower Limits of Detection (LLD) Nuclide: _____ Nuclide: _____

Gross Background Counts: _____ _____
Total Background Count time: _____ _____

$$\text{LLD (95\%)} = \frac{\sqrt{\text{Gross Background Counts}}}{\text{Count Time}} \times 4.66$$

LLD (95%)= _____ _____

REMARKS:

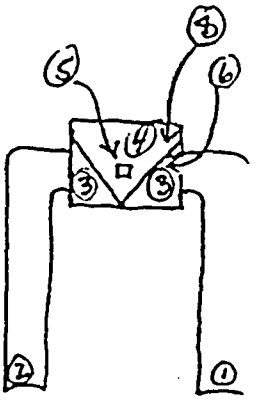
CC: Anne Fairbrother
Dave Schmidtling
Jay Gile

TO: Bob Trippel
FROM: Phil Monaco, Radiation Safety PM
DATE: October 25, 1988
RE: WLD 15

As per the recommendation made at the recent Radiation Safety meeting, I made swipes of various locations in the ventillation system in wildlife building' room 15. Room 15 has been used for three experiemnts using moderately high concentrations of a radiolabeled organic molecule (H-3). This radiolabel is a long-lived nuclide (12 yrs) and the organic compound BaP has a low vapor pressure and therefore is not volatile. Subsequently, one would predict the chemical and label to still be inplace these two months following its use in August.

Listed below are the results (and interpretation) of my swipes.*

Sample Description	net cpm	net dpm
1. Right exit plenum in room 15	0	
2. Left exit plenum in room 15	0	
3. Filter box upstream of filter	11	138
4. Filter box downstream of filter	0	
5. Filter box temp-sensor	0	
6. Upstream side of filter non-polar extraction (hexane 3 replicates)	5	< LLD**
7. Upstream side of filter polar extraction (ethanol)	10	< LLD
8. Filter downstream side non-polar extraction	5	< LLD



Please note that swipes cover an area between 50-100 cm^2. The filter sampling was done on a peece of filter 15 cm^2 in area. BaP is a very non-polar molecule and therefore should be readily extracted by the hexane. Just in case there were polar degradation or metabolic by-products of the BaP, I also used ethanol extractions.

I will also point out that with the exception of the fiberglass plenum filters which were changed prior to the most recent exposure experiment, the ventillation system was not cleaned after the 1987 experiments. So, any contamination picked up with the swipes could be attributed to prior experiemants as well as to the most recent.

However, none of the swipes demonstrate a contamination problem. The quantity of eitheer tritium or BaP represented by the 138 dpm found in the filter box is trivial. I will personally clean the box out prior to the next experiment using gloves, labcoat, and respirator.

I personally believe , based on all the various swipes taken following hte last exposure, that air-born contamination was not a problem. Therefore, I do not recommend relaxing or changing any of the approved procedures. The measures that are in place and being taken seem to be doing an adequate job of ~~immobilizing~~ containing the tritium and BaP.

*Swipes were analyzed by standard techniques using background blanks and known standards for comparison.

**LLD= Lower Limits of detection.

88-35

AREA CONTAMINATION SURVEY SHEET

Radionuclide(s) Surveyed: ^{3}H Date: 10/25/84

Method of Detection: LSC

Radiation Safety Technician

Swipe #	Location RM #	Area	Nuclide: NET CPM	NET DPM	µCi	Nuclide: NET CPM	NET DPM	µCi
	WICD 15	Bkgrd	13					
		Right Exit plenum	0					
		Left Exit plenum	0					
		Filter box - up stream of filter	11	138				
		filter box downstream of filter	0					
		Filter box Temp-Sensor	0					
	Hexane Bkgrd.		13	43				
	Hex extract	outside filter	0					
		outside filter	0					
		outside filter	3	$<LLD_{95}$				
	EtOH	Bkgrd	11	46				
		outside filter	2	$<LLD_{95}$				
		outside filter	2	$<LLD_{95}$				
		50 dpm ^{3}H Std	30	43				
		460 dpm ^{3}H Std	214	420				

Calculation of Lower Limits of Detection (LLD)

	Nuclide: ^{3}H (Hex)	Nuclide: (EtOH)
Gross Background Counts:	39	33
Total Background Count time:		

$$LLD\ (95\%) = \frac{\sqrt{\text{Gross Background Counts}}}{\text{Count Time}} \times 4.66$$

LLD (95%)=	10	9

REMARKS:

WLD 15 Filter System Filters

AREA CONTAMINATION SURVEY SHEET 38cm x 38cm

Radionuclide(s) Surveyed: ^3H Date: 10-19-88

Method of Detection: LSC

air Filter samples 6.5 cm² each

Radiation Safety Technician

Swipe #	Location RM #	Area	Nuclide: NET CPM	NET DPM (15 dpm/100cm²)	µCi	Nuclide: NET CPM	NET DPM	µCi
		BKGRD	15	36				
		Filter in-side	1	< LLD 85				
		Filter in-side residue	6	< LLD				
		Filter out-side	2	< LLD				
		Filter out-side residue	9	46	708			
			26	44				
			209	~~425~~ 425				
			12210	37341				

Calculation of Lower Limits of Detection (LLD) Nuclide: ^3H Nuclide: ______

Gross Background Counts: 75 ______

Total Background Count time: 5 ______

$$(95\%) = \sqrt{\frac{\text{Gross Background Counts}}{\text{Count Time}}} \times 4.66$$

LLD (95%)= 8 ______

REMARKS:

METHODS 10/25/81 WTL 15.

fiberfilter : 15 cm^2 front & back pieces Separately extracted with solvent. The front (upstream face) was extracted using standard techniques and using 50 ml of hexane. The hexane was blown down & diluted to 5 mL & one ml aliquots was counted in Cocktail (optiflour-O)
Ethanol extraction were done on the same fiber samples using a similar technique.

WRF 115

MEMO

TO: Bob Trippel
FROM: Phil Monaco
DATE: February 29, 1988
RE: Wld 115 Swipes

Copies: J. Gile
D. Schmedding
T. Shiroyama

For the record, when the wildlife building test room (#115) was recently sealed, radioactive contamination was not sealed in or covered over as indicated by the swipes taken prior to the floor application:

Swipes taken January 19, 1988

Floor NW	12 dpm/100cm^2	5.4pCi/100cm^2*
Floor- West Center	0	0
Floor -SW	17	7.7
Floor -NE	12	5.4
Floor -N Center	10	4.5
Floor -SE	0	0
Floor -door area NE	17	7.7
Floor -door area E center (E. WALL)	0	0
Floor -door area SE	30	14

Swipes and Samples taken on February 1, 1988

Paint and concrete scrapings	0	0
" " " "	23	10.4
" " " "	0	0

All swipes were taken using a filter paper saturated with 2-propanol. 2-propanol does not cause significant (if any) quenching in Liquid scintillation counting.

*a pico-curie (pCi) = 1.0 x 10^{-12} Curies.

These swipes represent removable contamination levels. A "clean area" (non-radiation use area) is considered to have an unacceptable level of contamination if the removable radiation is greater than 50-200 dpm/100cm^2 (23-90 pCi/100cm^2). The standards that I use for CERL are at the low end. As you can see, the 115 work area would be considered a non-contaminated work area. Restricted work areas such as all of our labs can have 5 times the level of removable contamination (for a "clean area") and be acceptable. Again, it is our policy at CERL to minimize all contamination. We can always meet the most conservative limits. The wildlife facility is a "restricted" work area and yet is meeting the standards for a "clean, unrestricted" area.

NORTHROP

Environmental Sciences
Northrop Services, Inc.
A Subsidiary of Northrop Corporation
200 SW 35th Street
Corvallis, Oregon 97333
Telephone 503 757-4664

MEMO

TO: Bob Trippel, Facility Engineer

FROM: Phil Monaco, Radiation Safety

Date: December 21, 1987

c: Jay Gile
Bill Griffis
Anne Fairbrother
Dave Schmedding

RE: Contamination Swipes of the Wildlife Building Exhaust System.

As per your recent request, with the assistance of the maintenance personnel, on December 17, 1987 I sampled the exhaust filters found in the heat recovery mixer of the Wildlife Facility. The filter sampled (hi E-40) was one of twelve in parallel which exhausted room 15 as well as other test rooms.

Contamination swipes and samples were also taken in the exhaust filter box and duct of room 15. The results are listed below as disintegrations per minute (dpm) of tritium and picograms of Benzo[a]Pyrene (B[a]P). Proper and adequate controls and standard laboratory counting techniques were included in the sampling method to assure accurate results.

Sample No.		tritium contamination	B[a]P contamination
1.	hi E-40 recovery filter	0 dpm/cm^2	0 picograms/cm^2
2.	hi E-40 recovery filter dust	0 dpm/cm^2	0
3.	Room 15 standard filter sample	94	20
4.	Room 15 filter box swipe	19	4
5.	Room 15 exhaust duct swipe	2	<1

Each μCi of tritium label represents 4.8E-7 grams of B[a]P. Neither the level of radiation or B[a]P concentration presents a health hazard to maintenance personnel. However, our lab standards for radiation protection allows removable contamination to be 1 dpm/cm^2 in an unrestricted area and 5 dpm/cm^2 in a clean restricted radiation work area. Therefore the filter box and duct work in room 15 need to be decontaminated.

U.S. Environmental Protection Agency
Western Ecology Division

NRC Radioactive Materials License No. 36-12343-02 Termination and Facility Decommissioning

Date: **November 27, 2004**
Subject: **Room Survey: Terrestrial Ecophysiology Research Area (TERA) Control Center Final Contamination Survey.**

Description and Historic Use:

Instrument control room for exposure chambers (150 ft^2). Hydrogen-3 sealed source electron capture detector. The instrument was recently removed from the room and placed in secured storage. There is no record of leakage of any sealed sources used in this area.

Surveys:

A removable contamination survey was conducted in the TERA Control Center November 2004. The decommissioning records are enclosed. All points in the final surveyed demonstrated no significant contamination. Two swipes indicated very low levels of removable contamination from tritium (0.20 – 0.43 Bq/100 cm^2). This area meets the contamination criteria for unrestricted use based upon the isotopes used at our facilities.

Records for this room clearly demonstrate that contamination surveys were regularly performed, the area was not subject to any significant contamination events, and the room was maintained as a contaminate-free area. We determined it was unnecessary to conduct further contamination surveys in this area given these survey results and the Western Ecology Division's historic management of radioactive material use in this area. Records of the most recent historic surveys (i.e. prior to the final decommissioning surveys) of TERA Control center are included in this report.

Removable contamination was determined using methanol-wetted swipes counted in a Packard 2200 CA dual channel Liquid Scintillation Counter.

NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY

DATE 11-15-04 LOCATION TERA ROOM Control

INSTRUMENT Packard 2200 CA LSC

SERIAL NO. Ø36755

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
1	7	12	0.20
2	4	LLD95	ND
3	4	↓	↓
4	2		
5	4		
6	3		
7	3		
8	9	26	0.43
9	4	LLD95	ND
10	5	↓	↓

$LLD_{95} = \{(\text{---------}) \times 2.96\} + = 7$ CPM

BACKGROUND STANDARD (^3H 69,179 dpm) 4 CPM 56,056 dpm

87% eff

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
	19	LLD95	ND
	14	↓	↓
	13		
	19		
	16		
	14		
	15		
	16		
	13		
	20		

$LLD_{95} = \{(\text{---------}) \times 2.96\} + = 30$ CPM

BACKGROUND STANDARD (^{14}C 89,000 dpm) 22 CPM 85,603

102% eff

COMMENTS:

D. Mon
RADIATION SPCL.

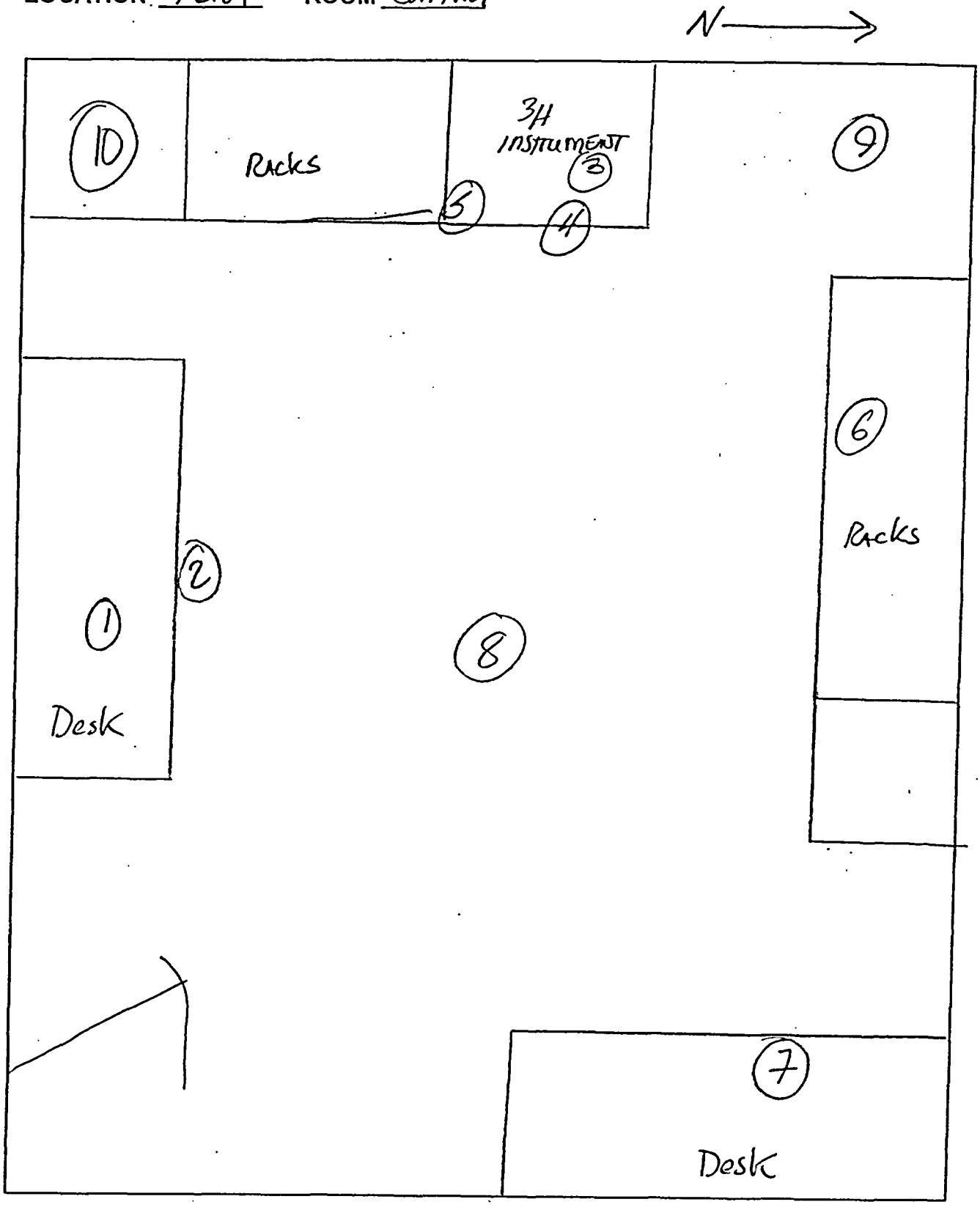
11-18-04
DATE

NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY MAP

LOCATION TERA ROOM Control



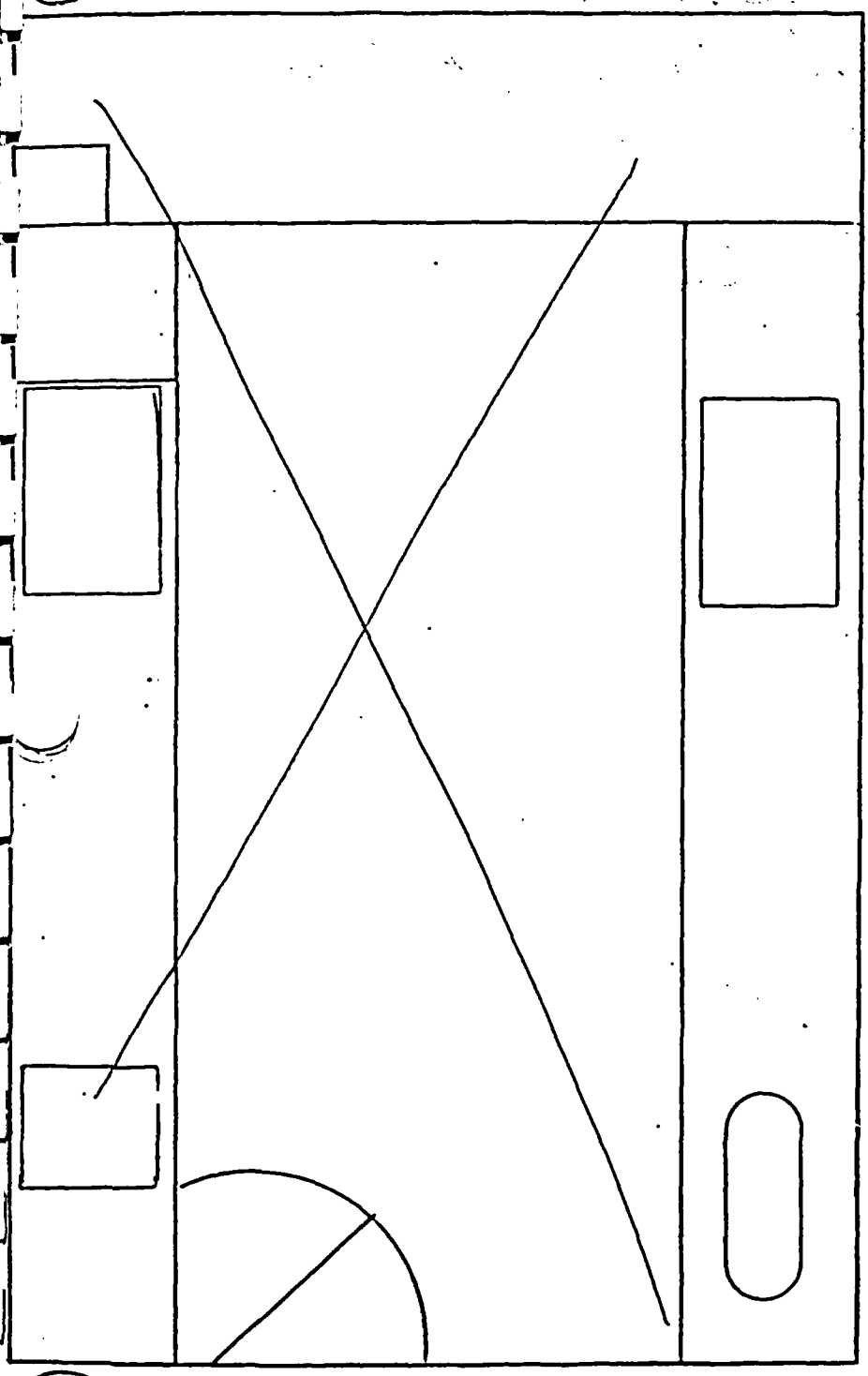
NHEERL-WED

RADIATION AREA SURVEY

LOG NO. 97-3 TRA

DATE 1-7-97

LOCATION ~~MAIN BLDG ROOM 100~~ Polyhouse



SWIPE #	GROSS CPM	NET DPM	ACTIVITY dpm/100 CM²
2	18	LLD₉₅	ND
3	19	↓	↓
4	13	↓	↓
5	17	↓	↓

$LLD_{95} = \{(\sqrt{18}) \times 2.96\} + 18 = 27$ CPM

BACKGROUND 18 CPM
STANDARD (^3H 97,929) 99158 DPM
INSTRUMENT Packard 2200CA
SERIAL NO. 036755

N

COMMENTS:

R.A. Nonn
RADIATION SPCL.

1/8/97
DATE

U.S. Environmental Protection Agency
Western Ecology Division

NRC Radioactive Materials License No. 36-12343-02 Termination and Facility Decommissioning

Date: November 27, 2004
Subject: Room Survey: Terrestrial Ecological Research Facility (TERF) 8-23 3/4 Final Contamination Survey.

Description and Historic Use:

Combined plant material handling rooms (200 ft^2 total). Plant tissue containing carbon-14 tracers was handled these rooms. No isotope use since 1990.

Surveys:

A total (fixed + removable) contamination survey was conducted in TERF 8-23 3/4 in November 2004. The decommissioning records are enclosed. All points surveyed (8) demonstrated no contamination. This area meets the contamination criteria for unrestricted use based upon the isotopes used at our facilities.

Records for this room clearly demonstrate that contamination surveys were regularly performed, the area was not subject to any significant contamination events, and the room was maintained as a contaminate-free area. We determined it was unnecessary to conduct further contamination surveys in this area given these survey results and the Western Ecology Division's historic management of radioactive material use in this area. Records of the most recent historic surveys (i.e. prior to the final decommissioning surveys) of TERF 8-23 3/4 are included in this report.

The survey for total contamination was conducted using a Ludlum Model 2000 Scaler equipped with a Ludlum Model 44-9, 12-cm^2 thin-window Geiger-Muller pancake detector.

NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY

FIXED SURVEY

DATE 11-11-04 LOCATION TERF ROOM Gen 823 Rooms 2+4

INSTRUMENT Ludlum 2000 Scaler PAncake Probe 44-9

SERIAL NO. 83810 / PR070834

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
1	32	LLD95	ND
2	34		
3	48		
4	42		
5	34		
6	32		
7	42		
8	36		

$LLD_{95} = \left\{ \left(\frac{\sqrt{38}}{0.5} \right) \times 2.96 \right\} + 76 = 113$ CPM

BACKGROUND STANDARD (14C 0.16 µCi) 10540 CPM 2.8% eff.

Time 0.5'

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²

$LLD_{95} = \left\{ \left(\quad \right) \times 2.96 \right\} + \quad =$ CPM

BACKGROUND STANDARD ( )

COMMENTS:

D Monaco
RADIATION SPCL.

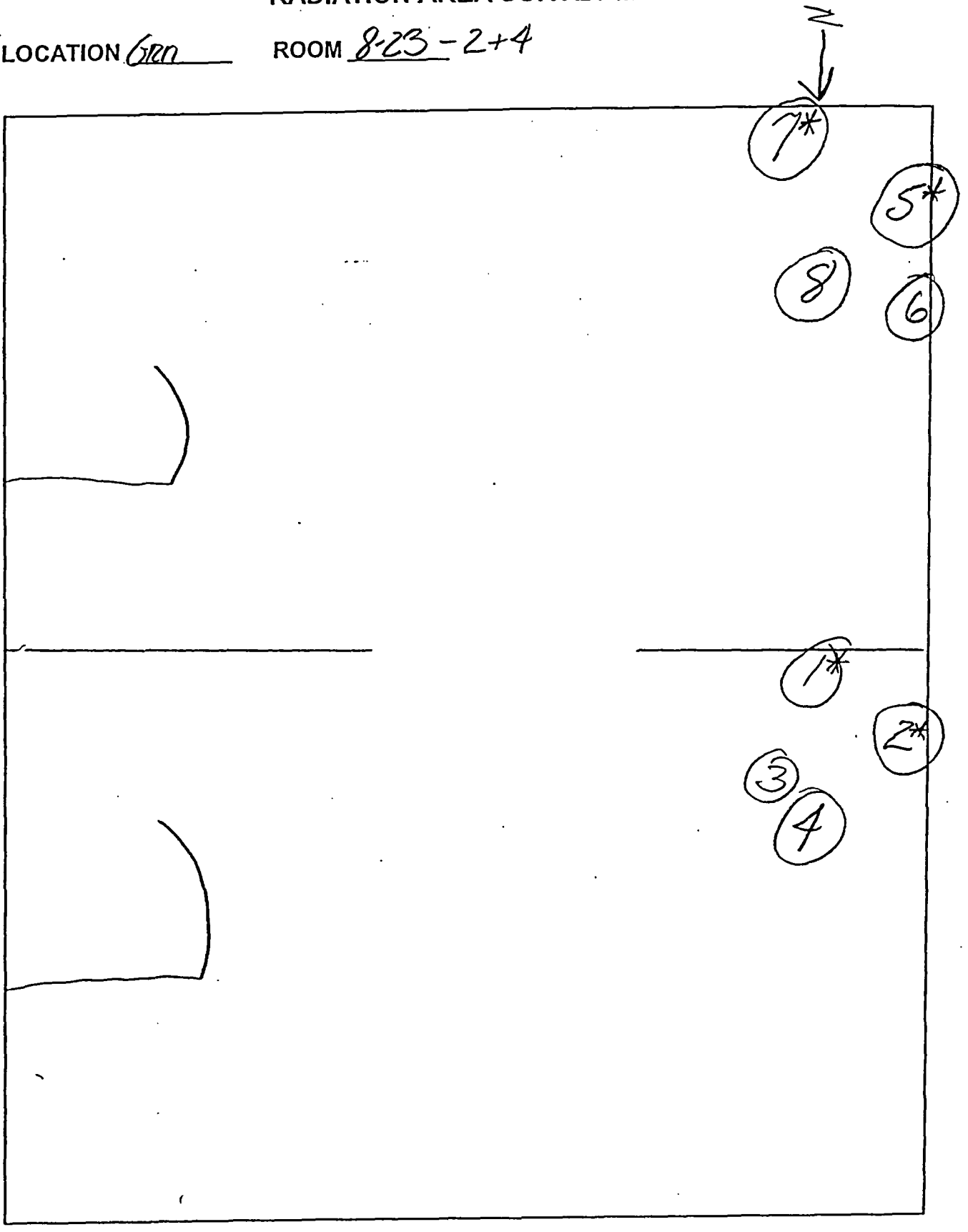
11-16-04
DATE

NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY MAP

LOCATION Glen ROOM 8-23-2+4



90-29

1/2

AREA CONTAMINATION SURVEY SHEET

Radionuclide(s) Surveyed: ^{14}C Date: 7-6-90

Method of Detection: LSC-460 Radiation Safety Technician

Background 25

Swipe #	Location RM #	Area	Nuclide: NET CPM	NET DPM	~~μCi~~ pCi	Nuclide: NET CPM	NET DPM	μCi
	GH84	Desk	0	N/A	N/A			
		Radio	0	N/A				
		Chair	2	<LLD				
		Sink	0	N/A				
		Counter	0	N/A				
		Cart	0	N/A				
		Floor	0	N/A				
		Floor	3	<LLD				
		Lyophilizer	0	N/A				
		Lyophilizer (N)	4	<LLD				
		door	0	N/A				
	C-2	Floor	0	N/A	↓			
		Floor	47	54	24			
		Door	1	<LLD	N/A			

Calculation of Lower Limits of Detection (LLD)

	Nuclide: ^{14}C	Nuclide:
Gross Background Counts:	250	
Total Background Count time:		

$$(95\%) = \sqrt{\frac{\text{Gross Background Counts}}{\text{Count Time}}} \times 4.66$$

LLD (95%): 7

REMARKS:

AREA CONTAMINATION SURVEY SHEET

Radionuclide(s) Surveyed:_____ Date:_____

Method of Detection:_____

_____
Radiation Safety Technician

Swipe #	Location RM #	Area	Nuclide: NET CPM	NET DPM	µCi	Nuclide: NET CPM	NET DPM	µCi	
	[illegible]	S Counter	0	N/A	N/A				
		S Counter	0	↓	↓				
		S Counter	0						
		Floor	0						
		Floor	0						
		N Counter	0						
		DESK	0						
		DOOR	0	↓	↓				

STANDARDS ON ATTACHED PRINT OUT

Calculation of Lower Limits of Detection (LLD) Nuclide:_____ Nuclide:_____

Gross Background Counts: _____ _____

Total Background Count time: _____ _____

$$LLD\ (95\%) = \frac{\sqrt{\text{Gross Background Counts}}}{\text{Count Time}} \times 4.66$$

LLD (95%)= _____ _____

REMARKS:

90-24
1/4

AREA CONTAMINATION SURVEY SHEET

Radionuclide(s) Surveyed: ^{35}S ^{14}C Date: 5-21-90

Method of Detection: LSC-460

Radiation Safety Technician

Swipe #	Location RM #	Area	Nuclide: NET CPM	NET DPM	~~pCi~~ ~~µCi~~	Nuclide: NET CPM	NET DPM	µCi	
	648	BKGRD	23	—	N/A				
		door	Ø net	Ø net					
		E counter	Ø	Ø net					
		W counter	3	< LLD95					
		W counter	0	Ø net					
		Radio	0	Ø net					
		desk	0	Ø net					
		chair	0	Ø net					
		Floor	0	Ø net	✓				
		Floor	7	8	4				
	TERF	WEST DOOR	0	Ø net	N/A				
		FLOOR (DOOR)	1	< LLD95	✓				
		Floor (Hall)	4	< LLD					
		Work Area Floor	0	Ø net					
		" Floor	0	Ø net					

Calculation of Lower Limits of Detection (LLD) Nuclide: _____ Nuclide: _____

Gross Background Counts: 230 _____

Total Background Count time: _____ _____

$$(95\%) = \sqrt{\frac{\text{Gross Background Counts}}{\text{Count Time}}} \times 4.66$$

LLD (95%): 7 _____

REMARKS:

AREA CONTAMINATION SURVEY SHEET

Radionuclide(s) Surveyed:_____ Date:_____

Method of Detection:_____

_____
Radiation Safety Technician

Swipe #	Location RM #	Location Area	Nuclide: NET CPM	NET DPM	µCi	Nuclide: NET CPM	NET DPM	µCi
	TERF	Work area Floor (SW)	0 net	0 net	N/A			
		"	0	0 net				
		"	0	0 net				
		"	0	0 net				
		"	0	0 net				
		"	1	~~0 net~~ <LLD				
		Between Chamber Floor	1	~~0 net~~ <LLD				
		"	1	~~0~~ <LLD				
		"	10	11	5			
		"	8	9	4			
		Back of Chamber 27	21	24	11			
		"	5	<LLD	N/A			
		"	0	0 net				
		Side of chamber 27	0	0 net				
		~~27~~ (21) Front of Chamber	0	0 net				

Calculation of Lower Limits of Detection (LLD) Nuclide:_____ Nuclide:_____

Gross Background Counts: _____ _____
Total Background Count time: _____ _____

$$(95\%) = \sqrt{\frac{\text{Gross Background Counts}}{\text{Count Time}}} \times 4.66$$

LLD (95%)= _____ _____

REMARKS:

AREA CONTAMINATION SURVEY SHEET

Radionuclide(s) Surveyed:_____ Date:_____

Method of Detection:_____

_____
Radiation Safety Technician

Swipe #	Location RM #	Location Area	Nuclide: NET CPM	NET DPM	µCi	Nuclide: NET CPM	NET DPM	µCi
	TOEF	Door Chamber 27	1	<LLD95	N/A			
		Door Chamber 27	Ø net	Ø net				
		Inside 27	0	Ø net				
		"	1	<LLD95				
		"	6	<LLD95				
		"	0	Ø net				
		Chair	0	Ø net				
		Control Pannel	1	<LLD				
		Control Panel	0	Ø				
		E Door	0	Ø				
		E Floor	0	Ø				
		Restroom ♂	0	Ø				
		Chamber 14 Door	0	Ø				
		" Inside Floor	0	Ø				
		Inside Floor	0	Ø	↓			

Calculation of Lower Limits of Detection (LLD) Nuclide:_____ Nuclide:_____

Gross Background Counts: _____ _____
Total Background Count time: _____ _____

$$(95\%) = \sqrt{\frac{\text{Gross Background Counts}}{\text{Count Time}}} \times 4.66$$

LLD (95%)= _____ _____

REMARKS:

AREA CONTAMINATION SURVEY SHEET

Radionuclide(s) Surveyed:_____ Date:_____

Method of Detection:_____

_____
Radiation Safety Technician

Wipe #	Location RM #	Area	Nuclide: NET CPM	NET DPM	μCi	Nuclide: NET CPM	NET DPM	μCi	
		Inside wall	0	Ø	N/A				
		Inside wall	0	Ø					
		FRONT Chamb. 14	0	Ø					
		FRONT	1	<LLD					
		CONTROL Panel	0	Ø					
		FLOOR	0	Ø					
		FLOOR	0	Ø					
		FLOOR	0	Ø					
		CHAMBER WASTE CAN	1	<LLD					
		WASTE CAN 27	0	Ø					
		S. DOOR	0	Ø					
		W WALL	0	Ø					
		W WALL	0	Ø					
		W WALL	0	Ø					
		W WALL	3	$<LLD_{95}$	↓				

Calculation of Lower Limits of Detection (LLD) Nuclide:_____ Nuclide:_____

Gross Background Counts: _____ _____

Total Background Count time: _____ _____

$$LLD\ (95\%) = \frac{\sqrt{\text{Gross Background Counts}}}{\text{Count Time}} \times 4.66$$

LLD (95%)= _____ _____

REMARKS:

89-42

AREA CONTAMINATION SURVEY SHEET

Radionuclide(s) Surveyed: ^{14}C Date: 12-1-89

Method of Detection: LSC-460

Radiation Safety Technician

Swipe #	Location RM #	Area	Nuclide: NET CPM	NET DPM	µCi	Nuclide: NET CPM	NET DPM	µCi	
1		BKGRD	26	N/A	N/A				
2	8-4	Door - B	Ø	N/A	N/A				
3		Lyophilizer Chamber Tank	177	199	8.9×10^{-5}				
4		Lypho lid	31	35	1.6×10^{-5}				
5		Lypho Surface	19	21	9.5×10^{-6}				
6		floor	Ø	N/A	N/A				
7	8-23	door	Ø	N/A	N/A				
8		Counter	15	16	7.2×10^{-6}				
9		Floor	6	< LLD95	N/A				
10		Floor	3	"					
11		WALL	1	"					
12		WALL	0	"					
13	STD	^{14}C 1079 dpm	1054	1176	5.3×10^{-4}				
14	STD	^{14}C 10828	10130	10,881	4.9×10^{-3}				
15	STD	^{14}C 108,102	9965 99523	106,968	4.8×10^{-2}				

Calculation of Lower Limits of Detection (LLD) Nuclide: ^{14}C Nuclide:

Gross Background Counts: 260

Total Background Count time: 10'

LLD (95%) = $\sqrt{\frac{\text{Gross Background Counts}}{\text{Count Time}}} \times 4.66$

LLD (95%) = 7.5

REMARKS:

U.S. Environmental Protection Agency
Western Ecology Division

NRC Radioactive Materials License No. 36-12343-02 Termination and Facility Decommissioning

Date: **November 27, 2004**
Subject: **Room Survey: Terrestrial Ecological Research Facility (TERF) 105 Final Contamination Survey.**

Description and Historic Use:

Former hydrocarbon instrument lab (300 ft^2 total). Nickel-63 and hydrogen-3:scandium sealed sources. No isotope use since 1983. There is no record of leakage of any sealed sources used in this area. There is no record of leakage of any sealed sources used in this area.

Surveys:

Total (fixed + removable) and removable contamination surveys were conducted in TERF 105 in November 2004. The decommissioning records are enclosed. All points surveyed (25 total and 25 removable) demonstrated no contamination. This area meets the contamination criteria for unrestricted use based upon the isotopes used at our facilities.

The area was not subject to any significant contamination events. We determined it was unnecessary to conduct further contamination surveys in this area given these survey results and the Western Ecology Division's historic management of radioactive material use in this area.

The survey for total contamination was conducted using a Ludlum Model 2000 Scaler equipped with a Ludlum Model 44-9, 12-cm^2 thin-window Geiger-Muller pancake detector. Removable contamination was determined using methanol-wetted swipes counted in a Packard 2200 CA dual channel Liquid Scintillation Counter.

NHEERL-WED

LOG NO. 04-25

RADIATION AREA SURVEY

FIXED SURVEY.

DATE 11-24-04 LOCATION TERF ROOM 105

INSTRUMENT Ludlum 2000 Scaler PAncake Probe 44-9

SERIAL NO. 83810 / PR070834

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
1	42	<LLD95	ND**
2	76		
3	46		
4	42		
5	62		
6	32		
7	34		
8	44		
9	38		
10	68		
11	36		
12	38		
13	44		
14	64		
15	52		
16	54		
17	60		
18	38		
19	58		
20	32		
21	34		
22	48		
23	58		
24	42		
25	74		

$LLD_{95} = \{(\frac{\sqrt{62}}{0.5}) \times 2.96\} + = 108$ CPM

BACKGROUND STANDARD (14C 0.168 µCi) 62 CPM / 8,347 CPM

4.9 % eff

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²

$LLD_{95} = \{(\quad) \times 2.96\} + =$ CPM

BACKGROUND STANDARD ( )

COMMENTS: ND* = NOT DETERMINED. Below the Detection Limits.

Blood
72
48
61

RADIATION SPCL.

11-24-04
DATE

NHEERL-WED

LOG NO. 04-25

RADIATION AREA SURVEY

Removable

DATE 11-24-04 LOCATION TERF ROOM 105

INSTRUMENT PACKARD 2200 CA

SERIAL NO. Ø36755

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
1	5	LLD95	ND*
2	3		
3	6		
4	5		
5	3		
6	7		
7	3		
8	3		
9	5		
10	3		
11	5		
12	6		
13	4		
14	2		
15	7		
16	5		
17	7		
18	8		
19	7		
20	1		
21	4		
22	5		
23	6		
24	8		
25	7		

$LLD_{95} = \left\{\left(\frac{\sqrt{21}}{3}\right) \times 2.96\right\} + = 12$ CPM

BACKGROUND STANDARD (^3H 64,179 dpm) 7 cpm / 60,012 dpm

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
	14	LLD95	ND*
	16		
	13.		
	12		
	12		
	11.		
	14.		
	12		
	12		
	13.		
	11		
	12		
	13		
	11		
	10		
	13.		
	15.		
	14		
	14.		
	13		
	13.		
	8.		
	15.		
	10		
	11		

$LLD_{95} = \left\{\left(\frac{\sqrt{39}}{3}\right) \times 2.96\right\} + = 19$ CPM

BACKGROUND STANDARD (^{14}C 89,000 dpm) 13 CPM / 85,006 dpm

COMMENTS: ND* = NOT DETERMINED. Below the detection limits.

Q. Mona
RADIATION SPCL.

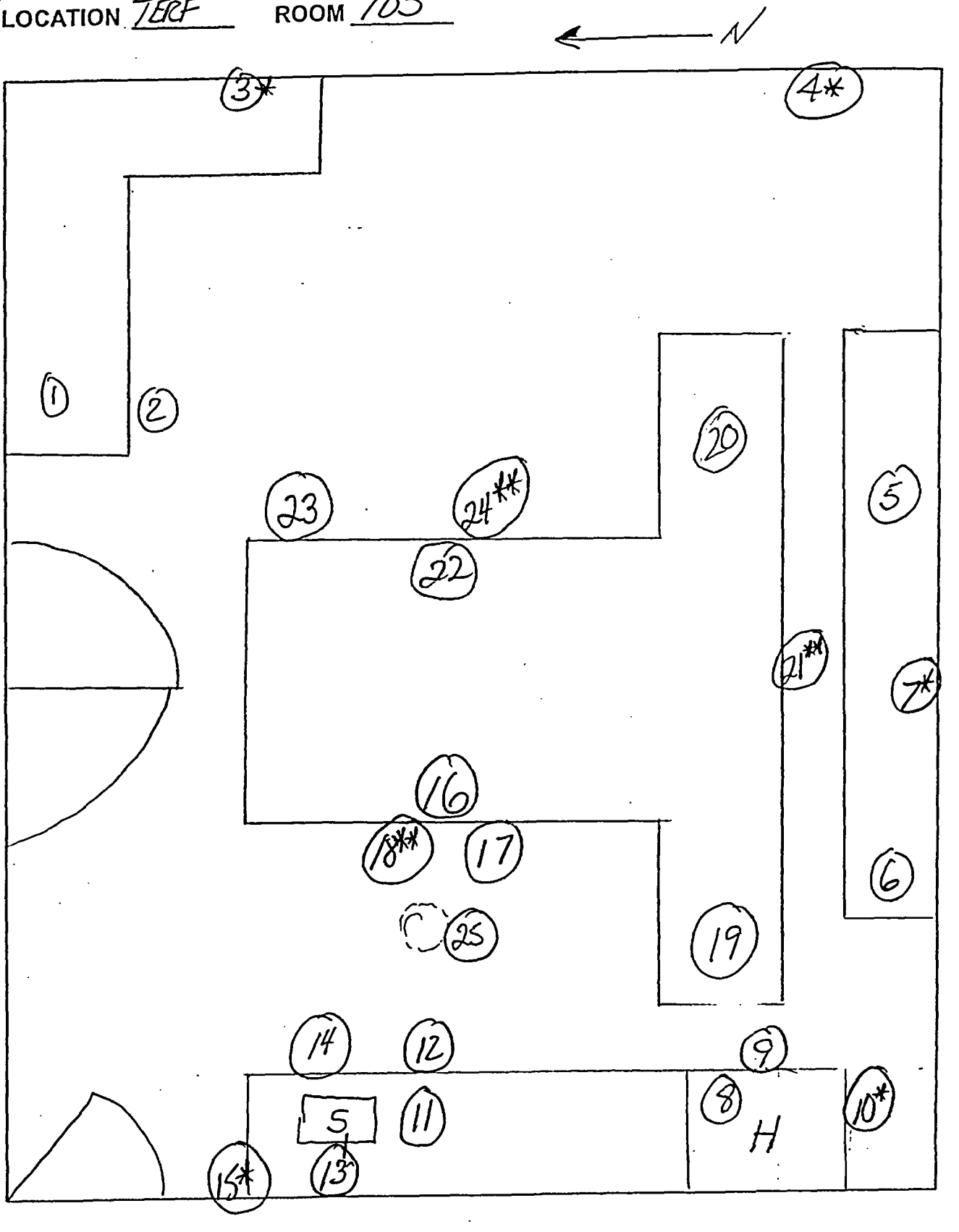
11-26-04
DATE

NHEERL-WED

LOG NO. 04-25

RADIATION AREA SURVEY MAP

LOCATION TERF ROOM 105



U.S. Environmental Protection Agency
Western Ecology Division

NRC Radioactive Materials License No. 36-12343-02 Termination and Facility Decommissioning

Date: **November 27, 2004**
Subject: **Room Survey: TERF 113 Final Contamination Survey.**

Description and Historic Use:

Exposure room (300 ft^2). Carbon-14 and rubidium-86 tracers. This room was decommissioned as a unrestricted area on June 8, 1993. No isotope use since1988.

Surveys:

Total (fixed + removable) and removable contamination surveys were conducted in TERF 113 at the time of restricted use decommissioning. The decommissioning records are enclosed. All points surveyed demonstrated no contamination. This area meets the contamination criteria for unrestricted use based upon the isotopes used at our facilities. HVAC duct swipes made in November 2004 indicated no significant contamination (0.37 Bq/100 cm^2).

Records for this room clearly demonstrate that contamination surveys were regularly performed, the area was not subject to any significant contamination events, and the room was maintained as a contaminate-free area. We determined it was unnecessary to conduct further contamination surveys in this area given these survey results and the Western Ecology Division's historic management of radioactive material use in this area. Records of the most recent historic surveys (i.e. prior to the final decommissioning surveys) of TERF 113 are included in this report.

The survey for total contamination was conducted using a Ludlum Model 3 Survey Meter equipped with a Ludlum Model 44-9, 12-cm^2 thin-window Geiger-Muller pancake detector.

OK file

MANTECH ENVIRONMENTAL TECHNOLOGY , INC
200 SW 35TH STREET, CORVALLIS, OREGON 97333

M E M O R A N D U M

Date: June 8, 1993
From: Phil Monaco, Health and Radiation Safety
To: Jay Gile

Subject: Decommission of TERF 113

During the week of June 1, 1993, Tom Pfleeger cleaned, decontaminated and swipe-tested for radioisotope contamination the TERF 113 Plant Exposure Room and the housed equipment. Room swipes taken by Pfleeger indicated removable contamination in the room to range between 0-13 dpm/100cm^2 net. Results of the equipment swipes ranged between 2-33 dpm/100cm^2 net.

On June 7, 1993, I conducted a contamination survey of the room and equipment for removable and fixed (non-removable) beta and gamma contamination and radiation levels. Removable contamination swipes indicated all were at or below background. Sixteen 100cm^2 swipes were made. The fixed contamination survey indicated that all areas surveyed were at background levels. The radiation levels are at background (<0.2 mR/Hr) and therefore do not present an external radiation hazard.

The ERL-C acceptable level of removable and fixed contamination for a non-restricted area for beta- and gamma - emitters is 50 dpm/100cm^2 and 5000 dpm/100cm^2 respectively.

Historically, the room was used for carbon-14 labelled organic and rubidium-86 labelled inorganic (1987) plant uptake experiments.

Based on the condition of the room and the survey results, I recommend that TERF 113 be recognized as decommissioned for radioisotope use.

C: T. Pfleeger

U.S EPA
ENVIRONMENTAL RESEARCH LABORATORY -CORVALLIS

Log No. 23-11

RADIATION CONTAMINATION SURVEY

6/7/93 Type of Survey: Radiation Survey

Isotope(s): _____

Gross Background Counts: 75 ± CPM Total Count Time (min.): 1

Lower Limits of Detection: $(\sqrt{75})2.96 = 25.6$ = cpm

Instrument Used: ☐ GFPC ☐ LSC ☐ Ion Chamber ☑ GM ☐ Scintillation Model: Ludlum #3 GM Probe 44-7 S/N: 77207/PR92614

Background: 0.02 mR/Hr (75 CPM±SD) DPM±SD Standard (Cs^{137} / mR Shielded): 0.4 mR/Hr % Error

Swipe No.	Room No.	Swipe Description	Nuclide: ~~per 100 cm²~~ ~~CPM±SD~~	~~Net DPM~~	~~Net Activity~~	Nuclide: per 100 cm² CPM±SD	Net DPM	Net Activity
		TERF 113 Room Survey			0.02 mR/Hr			

Comments: Survey radiation level at background of 0.02 mR/Hr.

[signature] 6/9/93
Radiation Safety Date

(9/70)

U.S EPA
ENVIRONMENTAL RESEARCH LABORATORY -CORVALLIS

Log No. 93-10

RADIATION CONTAMINATION SURVEY

Date: 6/7/93 Type of Survey: Removable Contamination
TEEF DECOMMISSIONING

Isotope(s): ^{14}C

Gross Background Counts: 24 ± CPM Total Count Time (min.): 1

Lower Limits of Detection: $(\sqrt{24})2.96 = 15$ = cpm

Instrument Used: ☐ GFPC ☒ LSC ☐ Ion Chamber ☐ GM ☐ Scintillation Model: Packard LSC 2200 CA S/N: 36755
^{14}C NEW 84,840 dpm

Background: 24 CPM±SD 27 DPM±SD Standard (A76): 84231 100 2σ% Error

Swipe No.	Room No.	Swipe Description	Nuclide: ____ per 100 cm² CPM±SD	Net DPM	Net Activity	Nuclide: ____ per 100 cm² CPM±SD	Net DPM	Net Activity
	TEEF 113	DOOR	Ø	Ø				
		TABLE	Ø	Ø				
		Counter	Ø	Ø				
		Wall (W)	Ø					
		Wall (W)	Ø					
		Wall (E)	Ø					
		Wall (E)	1	<LLD95				
		Floor W	Ø	Ø				
10		Floor W	Ø	Ø				
		Floor E	Ø	Ø				
		Floor E	2	<LLD95				
		Floor C	Ø	Ø				
		Floor C	3	<LLD95				
5		CART	1	<LLD95				
		Phone	4	<LLD95				

Comments:

Radiation Safety Date 6/8/93

(9/70)

U.S EPA
ENVIRONMENTAL RESEARCH LABORATORY -CORVALLIS

Log No. 93-9

RADIATION CONTAMINATION SURVEY

6-7-93 Type of Survey: FIXED CONTAMINATION
TERF-113 DECOMMISSIONING

Isotope(s): ^{14}C

Gross Background Counts: ____ ± ____ CPM Total Count Time (min.): ____

Lower Limits of Detection: ____ = ____ cpm

Instrument Used: ☐ GFPC ☐ LSC ☐ Ion Chamber ☐ Scintillation ☒ ~~GM~~ Model: Ludlum #3 S/N: 77146/76877

Eliminate

Background: 50 CPM±SD ____ DPM±SD Standard (^{137}Cs 14.5K CPM): ^{14}C 7.1% EFF ~~% Error~~

Swipe No.	Room No.	Swipe Description	Nuclide: ____ per 100 cm² CPM±SD	Net DPM	Net Activity	Nuclide: ____ per 100 cm² CPM±SD	Net DPM	Net Activity
		Floor areas	all less than Background		0 net activity			
		Door.						
		Tables						
		Walls						
		Carts						

Comments:

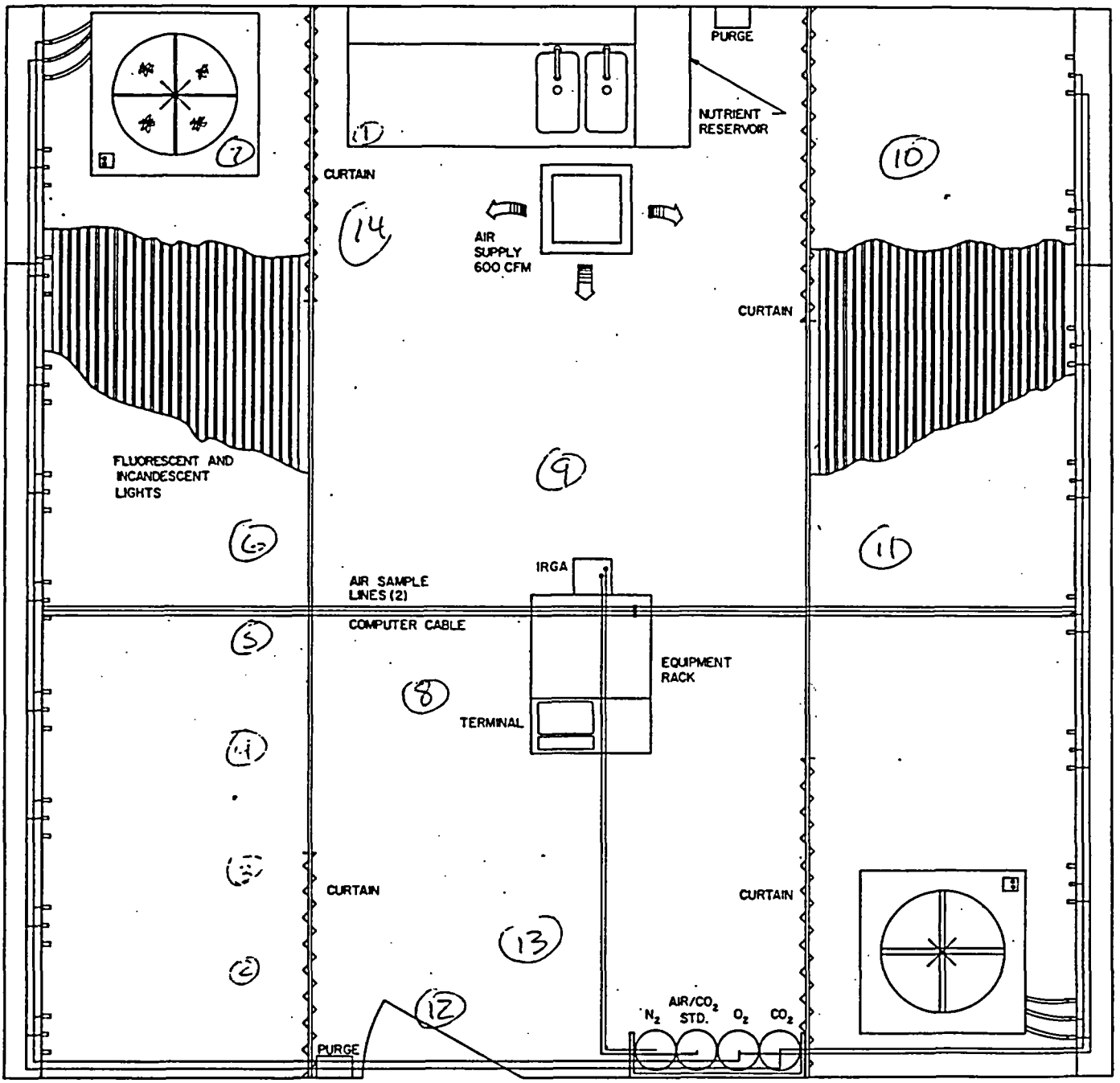
Larry A Mann 6/7/93
Radiation Safety Date

(9/70)

rotocol #:13 Name:Ch...Swipes 28-M..-93 10:35
egion A: LL-UL= 0.0-156. Lcr= 18 Bkg= 0.00 %2 Sigma=2.00
egion B: LL-UL= 4.0-156. Lcr= 0 Bkg= 0.00 %2 Sigma=0.00
egion C: LL-UL= 0.0- 0.0 Lcr= 0 Bkg= 0.00 %2 Sigma=0.00
ime = 10.00 QIP = tSIE ES Terminator = Count
...tional DPM
...de 1 = 113700
uminescence Correction On

#	TIME	CPMA	A:2S%	CPMB	FLAG	LUM	tSIE	Gross DPM1	
1	10.00	34.30	31.17	18.10	E	83	55.7	47.87	Background
2	10.00	30.20	25.13	20.50	E	68	56.1	42.12	
3	10.00	27.50	18.75	19.60	E	43	63.1	37.88	Room Range cpm 0-6 dpm net
4	10.00	25.00	23.89	19.80	E	58	67.6	34.17	
5	10.00	33.30	19.54	21.40	E	57	57.5	46.33	
6	10.00	23.10	22.66	18.10	E	52	64.6	31.74	
7	10.00	38.50	27.18	18.70	E	79	73.2	52.12	5 dpm net
8	10.00	44.10	17.25	24.60	E	55	60.2	61.06	13 dpm net
9	10.00	23.50	24.17	18.90	E	60	50.9	33.08	
0	10.00	24.40	20.70	17.60	E	46	66.0	33.45	
11	10.00	27.90	16.67	19.50	E	34	64.5	38.34	
12	10.00	22.70	26.21	16.70	E	63	65.8	31.13	
3	10.00	27.10	24.73	17.70	E	65	55.2	37.86	
4	10.00	27.80	27.22	19.00	E	71	60.1	38.50	Room
15	10.00	26.90	19.20	20.30	E	45	60.5	37.23	
6	10.00	29.20	21.02	21.20	E	55	66.7	39.98	
7	10.00	35.90	18.96	23.90	E	54	51.7	50.46	2
18	10.00	35.80	17.03	24.00	E	47	70.2	48.72	
19	10.00	59.90	10.67	32.30	E	27	75.3	80.80	33 dpm net
0	10.00	30.30	20.33	19.10	E	53	83.0	40.34	
	10.00	26.50	38.05	17.50	E	85	81.4	35.37	

$$LLD_{95} = \left(\frac{\sqrt{18}}{10}\right)2.96 =$$



15 - 17

Figure 1. Plant exposure laboratory floor plan.

COUNTER TOP

-7 CART TOPS

#2, 7, 4, 3, 1, 8

FLOOR

TABLE TOP

FLOOR WEST SIDE

DOOR

FLOOR by DOOR

FLOOR by COUNTER

-17 CART COVERS HANGING FROM CEILING

- INSIDE CART 2

19 " 4

1

21 BLANK

U.S EPA
ENVIRONMENTAL RESEARCH LABORATORY -CORVALLIS

RADIATION CONTAMINATION SURVEY

Log No. 91-36
1/3

e: 11-4-91 Type of Survey: Removable Contamination.

s): S^{35} Cr^{51} ^{14}C ^{3}H $^{3}H = 4.1$ cpm $^{14}C = 10.3$ cpm

ss Background Counts: ~~10~~ ± CPM Total Count Time (min.): 10'

ower Limits of Detection: $^{3}H = (\sqrt{41}/10) \times 466 = 3$ $^{14}C = (\sqrt{103}/10) \times 466 = 5$ cpm

trument Used: ☐ GFPC ☒ LSC ☐ GM ☐ Ion Chamber ☐ Scintillation Model: PACKARD 2200 S/N:

3/4 123,954 dpm 7%

kground: CPM±SD DPM±SD Standard (^{14}C 85,428 2%): % Error

pe	Room No.	Swipe Description	Nuclide: 3H per 100 cm²		pCi	Nuclide: 14C per 100 cm²		
			CPM±SD	Net DPM	Net Activity	CPM±SD	Net DPM	Net Activi
2	130	Hood sill	3	7	32 pCi	3	<LLD95	N/A
3		SASH	0	0	N/A	2		
4		Floor	0	0		2	↓	
5		N. Counter	0	6		0	0	
6		S. Counter	0	0		2	<LLD95	
7		door	0	0	↓	0	0	
8	232	S. Hood sill	4	13	5.9 pCi	1	<LLD95	
		SASH	2	<LLD95	N/A	0	0	
10		Floor	0	0		4	<LLD95	
11		N Hood sill	2	<LLD95		4	↓	
12		SASH	1	1		1	↓	
13		Floor	0	0		0	0	
14		desk	0	0		1	<LLD95	
15		Phone	1	<LLD95		0	0	
16		Floor	0	0		0	0	
17		counter	0	0		1	<LLD95	
18		door	0	0		0	0	
19	228	S Hood SASH	2	<LLD95		0	0	
20		Sill	1	<LLD95		0	0	
21		Floor	0	0	↓	0	0	↓

ments:

Radiation Safety Date

(9/90)

U.S EPA
ENVIRONMENTAL RESEARCH LABORATORY -CORVALLIS

Log No. _____

RADIATION CONTAMINATION SURVEY

2/3

11-4-91 Type of Survey: _____

Isotope(s): _____

Gross Background Counts: _____ ± _____ CPM Total Count Time (min.): _____

Lower Limits of Detection: _____ * _____ cpm

Instrument Used: ☐ GFPC ☐ LSC ☐ GM ☐ Ion Chamber ☐ Scintillation Model: _____ S/N: _____

Background: _____ CPM±SD _____ DPM±SD Standard (_____): _____ % Error

Wipe No.	Room No.	Swipe Description	Nuclide: 3H per 100 cm²		pCi	Nuclide: 14C per 100 cm²		
			CPM±SD	Net DPM	Net Activity	CPM±SD	Net DPM	Net Activity
22	228	Hood Floor	0	0	N/A	0	0	N/A
23		Floor	0	0		0	0	
24	256	door	1	<LLD95		0	0	
25		Phone	3	8	3.6 pCi	0	0	
26		Counter	2	<LLD95	N/A	3	<LLD95	
27		Desk	0	0	N/A	0	0	
		LSC	3	7	3.2 pCi	4	<LLD95	
29		hood ~~SILL~~	1	<LLD95	N/A	3	<LLD95	
30		Floor ~~SILL~~	1	<LLD95		0	0	
31	258	Hood ~~SILL~~	0	0		6	7	3.2 pCi
32		Floor	1	<LLD95		3	<LLD95	
33		LSC	1	<LLD95		3	<LLD95	
34		door	3	7	3.2 pCi	0	0	
35	TEF 113	TABLE	0	0	N/A	3	<LLD95	
36		Sink counter	0	0		0	0	
37		Floor	0	0		0	0	
38		door	0	0		2	<LLD95	
39		TABLE	0	0		2	<LLD95	
40		Floor	0	0		4	<LLD95	

Comments:

_____ / _____

Radiation Safety Date

(9/90)

U.S EPA
ENVIRONMENTAL RESEARCH LABORATORY -CORVALLIS

Log No. _____ 3/3

RADIATION CONTAMINATION SURVEY

_____ Type of Survey: _____

Isotope(s): _____

Gross Background Counts: _____ ± _____ CPM Total Count Time (min.): _____

Lower Limits of Detection: _____ * _____ CPM

Instrument Used: ☐ GFPC ☐ LSC ☐ GM ☐ Ion Chamber ☐ Scintillation Model: _____ S/N: _____

Background: _____ CPM±SD _____ DPM±SD Standard (_____): _____ % Error

Type No.	Room No.	Swipe Description	Nuclide: ^{3}H per 100 cm² CPM±SD	Net DPM	Net Activity		Nuclide: ^{14}C per 100 cm² CPM±SD	Net DPM	Net Activity	
41	190	Door	0	0	N/A		2	2 LLD95	N/A	
42		Floor	0	0			3	2 LLD95		
43		Counter (S)	0	0			2	2 LLD95		
44		Counter (S)	0	0			0	0		
45		Counter (N)	2	2 LLD95			1	2 LLD95		
46		Phone	0	0			0	0		
		Desk	0	0	↓	ERROR	0	0	↓	
		^{3}H 1.4×10^{-4} µCi	126	213	9.6×10^{-5}	32%	121	140	—	
	STANDARDS	^{3}H 1.17×10^{-3}	1,152	2,199	9.9×10^{-4}	15%	247	233	—	
		^{3}H 1.13×10^{-2}	11,211	2,1651	9.8×10^{-3}	14%	1818	1531	—	
		^{14}C 5.45×10^{-5} µCi	14	0	—		110	135	6.1×10^{-5}	12%
		^{14}C 5.38×10^{-4}	115	0	—		1011	1,225	5.5×10^{-4}	2%
		^{14}C 4.98×10^{-3}	1,046	0	—		8739	10,584	4.8×10^{-3}	4%
		^{3}H PACKARD 6.05×10^{-2}	72749	123,957	5.6×10^{-2}	8%	6846	2419	—	
		^{14}C NEN 3.8×10^{-2}	10,570	0			71,553	85,428	3.8×10^{-2}	0%

Comments:

_____ / _____
Radiation Safety Date

(9/70)

88-13

AREA CONTAMINATION SURVEY SHEET

Radionuclide(s) Surveyed: $^{3}H/^{14}C$

Date: 4/4/88
4/22/88

Method of Detection: LSC

P. Mcnaw
Radiation Safety Technician

Swipe #	Location RM #	Area	Nuclide: --- NET CPM	NET DPM	µCi	Nuclide: ^{14}C NET CPM	NET DPM	µCi	
			3H						
	190	door				0			
		Sink Counter				0			
		Counter				2			
		Floor				3			
1		door	2	<LLD		3	<LLD		
2		Counter #1	0	↓		0	↓		
3		2	1			0			
4		3	0			0			
5		Floor 1	0			0			
6		2	0			0			
7		3	2			2			
8		NE Sink	0			2			
9		NE Counter	4			0			
10		Phone	0	↓		3	↓		

Calculation of Lower Limits of Detection (LLD)

	Nuclide: ^{3}H	Nuclide: ^{14}C
Gross Background Counts:	37	41
Total Background Count time:	3	3

$$D\ (95\%) = \sqrt{\frac{\text{Gross Background Counts}}{\text{Count Time}}} \times 4.66$$

LLD (95%)=	10	10

REMARKS:

AREA CONTAMINATION SURVEY SHEET

Radionuclide(s) Surveyed: ^{14}C / ^{3}H Date: 4-22-88

Method of Detection: LSC

P. Mmac
Radiation Safety Technician

Swipe #	Location RM #	Location Area	Nuclide: 3H NET CPM	NET DPM	µCi	Nuclide: 14C NET CPM	NET DPM	µCi
11	228	Door	0	<LLD		0	<LLD	
12		NE Hood	0			5		
13	228	Phone	0			5		
14		Desk	0			0		
15		Floor (HPLC)	0			0		
16		Floor (Sink	0			2		
17	236	SE (Hood) Floor	0			1		
18		NE Floor (Hood)	0			0		
19		door	0			5		
20	256	door	0			1		
21		Phone	1			0		
22		Floor (door)	0			1		
23		Floor (hood)	0			0		
24		Floor (oxi)	0			1		
25		Counter (phone)	0			1		

Calculation of Lower Limits of Detection (LLD)

	Nuclide:	Nuclide:
Gross Background Counts:		
Total Background Count time:		

$$\text{LLD (95\%)} = \sqrt{\frac{\text{Gross Background Counts}}{\text{Count Time}}} \times 4.66$$

LLD (95%)= | |

REMARKS:

AREA CONTAMINATION SURVEY SHEET

Radionuclide(s) Surveyed: $^{14}C/^{3}H$ Date: 4-22-88

Method of Detection: LSC

P. Mora
Radiation Safety Technician

Swipe #	Location RM #	Area	Nuclide: ^{3}H NET CPM	NET DPM	µCi	Nuclide: ^{14}C NET CPM	NET DPM	µCi
26	252	LSC	0	LLD		0	LLD	
27		Computer	0			0		
28		Refer	9			0		
29	258	LSC	0			0		
30		~~Floor~~ (Hood)	0			0		
31		Floor (Sink)	0			0		
32		Door	0			0		
33		Counter (SW)	2			0		
34		Refer	1			3		
35	TEMP 113	TABLE	~~11~~ 6			3		
36		Floor SC	0			6		
37		CW	0			2		
38		NC	0			3		
39		~~SE~~	0			~~11~~ 8		
40		CE NE	0			~~11~~ 7		

Calculation of Lower Limits of Detection (LLD) Nuclide: _____ Nuclide: _____

Gross Background Counts: _____ _____
Total Background Count time: _____ _____

$$\text{LLD (95\%)} = \sqrt{\frac{\text{Gross Background Counts}}{\text{Count Time}}} \times 4.66$$

LLD (95%)= _____ _____

REMARKS:

AREA CONTAMINATION SURVEY SHEET

Radionuclide(s) Surveyed: ^{14}C / ^{3}H Date: 4-22-88

Method of Detection: LSC

P. Moran
Radiation Safety Technician

3H / 14C

Swipe #	Location RM #	Location Area	Nuclide: NET CPM	Nuclide: NET DPM	Nuclide: µCi	Nuclide: NET CPM	Nuclide: NET DPM	Nuclide: µCi	
41	TERF 113	FLOOR SE	0			4			
42		Floor E	0			15			
43		E	0			9			
44		Sink Faucet	0			0			
45		Sink counter	0			2			
46		door	0			0			
47		Phone	1			0			
48		Sink	0			1			
49		CART	0			6			
50		Light Switch	2			6			
^{3}H		Qual std.		37606	✓		1715		
^{14}C		Qual std.		~~41525~~ 0			37263	✓	

Calculation of Lower Limits of Detection (LLD) Nuclide: _____ Nuclide: _____

Gross Background Counts: _____ _____
Total Background Count time: _____ _____

$$LLD\ (95\%) = \frac{\sqrt{\text{Gross Background Counts}}}{\text{Count Time}} \times 4.66$$

LLD (95%)= _____ _____

REMARKS:

U.S. Environmental Protection Agency
Western Ecology Division

NRC Radioactive Materials License No. 36-12343-02 Termination and Facility Decommissioning

Date: **November 27, 2004**
Subject: **Room Survey: TERF High Bay (HB) Final Contamination Survey.**

Description and Historic Use:

Very large room (4000 ft^2) housing plant growth chambers. Carbon-14 and hydrogen-3 tracers. No isotope use since1993.

Surveys:

A total (fixed + removable) contamination surveys was conducted in TERF HB in November 2004. The decommissioning records are enclosed. All points surveyed (17) demonstrated no contamination. This area meets the contamination criteria for unrestricted use based upon the isotopes used at our facilities.

Records for this room clearly demonstrate that contamination surveys were regularly performed, the area was not subject to any significant contamination events, and the room was maintained as a contaminate-free area. Records of several thorough contamination surveys conducted at the time of the most recent radiotracer experiments are enclosed. We determined it was unnecessary to conduct further contamination surveys in this area given these survey results and the Western Ecology Division's historic management of radioactive material use in this area.

The survey for total contamination was conducted using a Ludlum Model 3 rate meter equipped with a Ludlum Model 44-9, Geiger-Mueller 12-cm^2 thin-window Geiger-Muller pancake detector. Removable contamination was determined using methanol-wetted swipes counted in a Packard 2200 CA dual channel Liquid Scintillation Counter.

NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY

FIXED SURVEY

DATE 11-11-04 LOCATION TERF ROOM HB

INSTRUMENT Ludlum 2000 Scaler Pancake Probe 44-9

SERIAL NO. 83810 / PR070834

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
1	29	LLD95	ND
2	50		
3	50		
4	50		
5	32		
6	44		
7	32		
8	22		
9	48		
10	52		
11	38		
12	54		
13	56		
14	50		
15	34		
16	32		
17	52		

$LLD_{95} = \left\{\left(\frac{\sqrt{38}}{0.5}\right) \times 2.96\right\}\% = 113$ CPM

BACKGROUND STANDARD (^{14}C 0.16 µCi) 76 CPM / 19540 CPM, 2.8% off.

Time 0.5'

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²

$LLD_{95} = \{(\quad) \times 2.96\} + =$ CPM

BACKGROUND STANDARD ( )

COMMENTS:

R Monaco
RADIATION SPCL.

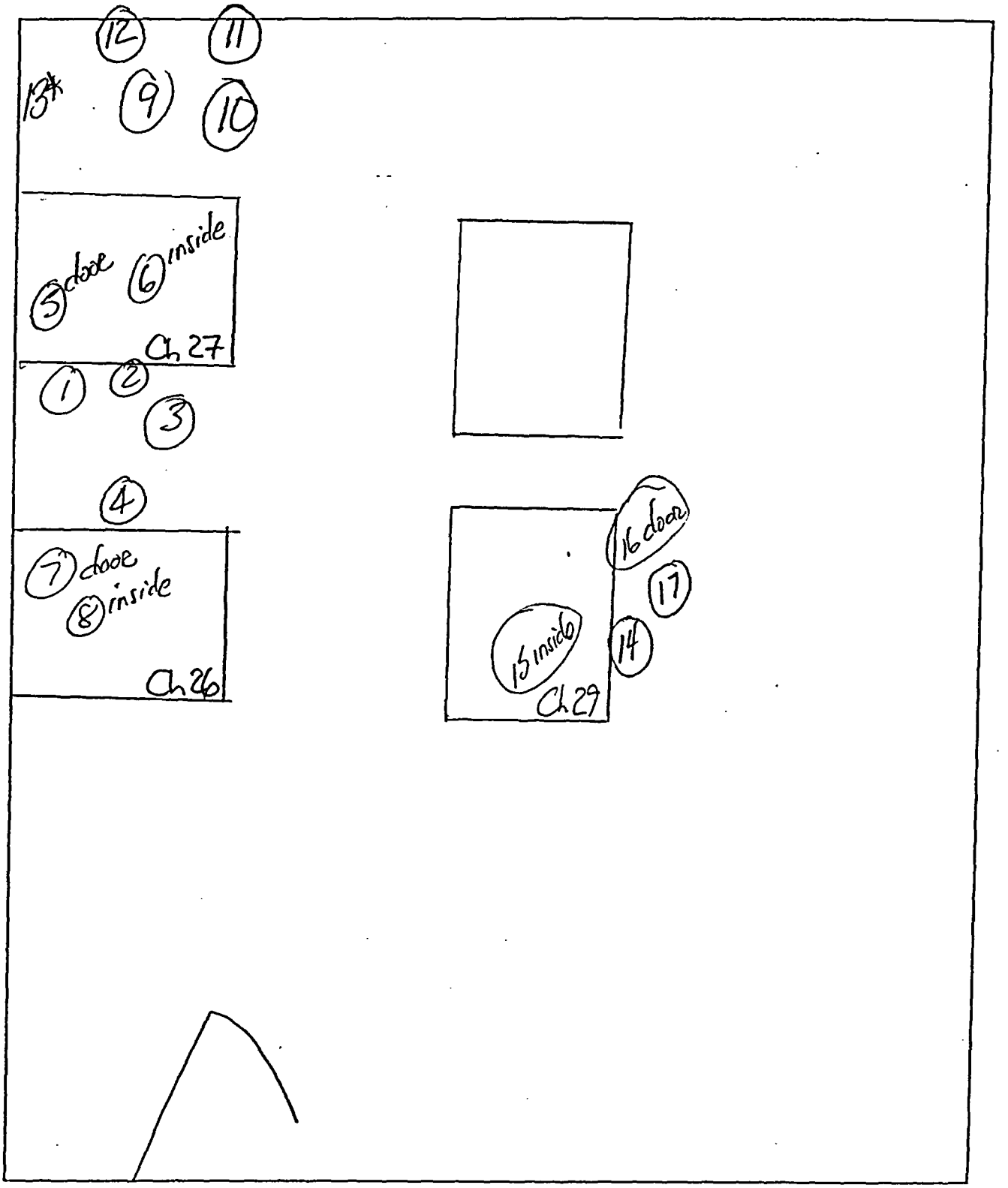
11-16-04
DATE

NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY MAP

LOCATION TERF ROOM HB



MANTECH ENVIRONMENTAL TECHNOLOGY , INC
200 SW 35TH STREET, CORVALLIS, OREGON 97333

M E M O R A N D U M

Date: February 18, 1993
From: Phil Monaco, Health and Radiation Safety
To: Jay Gile

Subject: Contamination Swipes of TERF Chambers

Reported below are the results of the contamination swipes I made following the completion of the second exposure experiment conducted by Dr. D. Armstrong, OSU, on Feb. 17, 1993 in two TERF high bay exposure chambers (Nos. 26 & 27). No incidents occurred during the experiment. The chemical used was a 3H-adenine compound. The area is clean and can be used for non-restricted space.

Swipe	Description	Activity pCi
2	Cart	0 net
3	Floor	0
4-6	Chamber 26, exposure chambers 1 & 2	0
7-9	Chamber 27, exposure chambers 3 & 4	0

cc: B. Hogsett
D. Field
D. Armstrong

Log No. 93-4

U.S EPA
ENVIRONMENTAL RESEARCH LABORATORY -CORVALLIS

RADIATION CONTAMINATION SURVEY

Date: 2/18/93 Type of Survey: Removable

Isotope(s): 3H

Gross Background Counts: 15 ± CPM Total Count Time (min.): 1

Lower Limits of Detection: $(\sqrt{15})2.96 = 11.5$ = cpm

Instrument Used: ☐ GFPC ☑ ~~LSC~~ ☐ GM ☐ Ion Chamber ☐ Scintillation Model: LSC 2200 CA S/N:

Background: 15 CPM±SD 43 DPM±SD Standard (~~Pack~~ Kard 3H 0.11495 μCi 11/79): Corrected eff = 92% ~~% Eff~~

Swipe No.	Room No.	Swipe Description	Nuclide: 3H per 100 cm² net CPM±SD	Net DPM	Net Activity	Nuclide: per 100 cm² CPM±SD	Net DPM	Net Activit
2	TERF	CART	Ø	Ø	Ø net			
3	High	Floor	Ø	Ø	↓			
4	Bay	Chamber # 26 door	~~Ø~~ 1	<LLD95	↓			
5	Chamber	exp. chamber # 1	Ø	Ø	↓			
6	↓	exp. Chamber # 2	Ø	Ø	↓			
	↓	chamber # 27 door	2	<LLD95	↓			
8	↓	exp. Chamber # 3	0	Ø	↓			
9	↓	exp. Chamber # 4	6	<LLD95	↓			

Comments: 3H exp. D. Armstrong. A.

D. A. Moore 12/18/93
Radiation Safety Date

(9/90)

U.S EPA
ENVIRONMENTAL RESEARCH LABORATORY -CORVALLIS

Log No. 93-2

93 DPM

RADIATION CONTAMINATION SURVEY

Date: 1-13-92 Type of Survey: Removable

Isotope(s): ^{3}H

Gross Background Counts: 14 ± CPM Total Count Time (min.): 1

Lower Limits of Detection: $(\sqrt{14})2.96 = 11$ = cpm

Instrument Used: ☐ GFPC ☐ LSC ☐ GM ☐ Ion Chamber ☐ Scintillation Model: LSC Packard 2200CA S/N:

Background: 14 CPM±SD 39 DPM±SD Standard (Packard 127,618 dpm): 115,619 dpm ~~± Error~~

Swipe No.	Room No.	Swipe Description	Nuclide: ____ per 100 cm² CPM±SD	Net DPM	Net Activity	Nuclide: ____ per 100 cm² CPM±SD	Net DPM	Net Activit
2	TERF1	Chamber 27 DOOR	1	Ø	Ø			
	HB	COSOM 3 FRONT	0					
		COSOM 3 inside	0					
5		COSOM 4 FRONT	1					
		COSOM 4 inside	0					
		~~COSOM~~ # 26 Door	4	LLD95				
		COSOM 1 FRONT	5	LLD95				
		COSOM 1 inside	Ø	LLD95				
10		COSOM 2 FRONT	Ø	Ø				
		COSOM 2 Inside	~~10~~ 4	LLD95				
		Chamber 27 inside	0	0				
		Chamber 26 inside	0	0				
		Cart	4	LLD95				
15		floor	0	0				

Comments:

Radiation Safety Date 1/14/93

(9/90)

col #:27 Name:3H.RadSafety 14-Jan-93 12:26
n A: LL-UL= 0.0-18.6 Lcr= 0 Bkg= 0.00 %2 Sigma=1.00
gion B: LL-UL= 2.0-18.6 Lcr= 0 Bkg= 0.00 %2 Sigma=1.00
egion C: LL-UL= 0.0- 0.0 Lcr= 0 Bkg= 0.00 %2 Sigma=0.00
ne = 1.00 QIP = tSIE ES Terminator = Count
tium , Std. curve generated by mean of 3 cts
nventional DPM
uclide 1 = 75580
inescence Correction On

S#	TIME	CPMA	DPM1	A:2S%	CPMB	B:2S%	SIS	tSIE	FLAG	LUM	
1	1.00	14.00	38.55	63.88	14.00	60.60	26.710	317.		7	Blank
2	1.00	15.00	40.10	63.94	15.00	58.11	19.360	329.		24	
3	1.00	13.00	34.94	73.78	12.00	66.66	22.590	327.		13	
4	1.00	12.00	33.00	74.53	12.00	70.71	22.330	318.		14	
5	1.00	15.00	44.01	61.10	15.00	54.97	27.710	293.		6	
6	1.00	11.00	31.15	60.30	10.00	63.24	24.650	306.		0	
7	1.00	18.00	50.65	47.14	16.00	49.99	28.260	308.		0	
8	1.00	19.00	53.00	54.69	16.00	55.90	20.100	312.		5	
9	1.00	15.00	41.57	61.10	15.00	58.11	29.100	314.		6	
10	1.00	13.00	36.22	76.92	12.00	70.71	23.950	312.		12	
1	1.00	18.00	49.87	54.43	17.00	51.28	20.950	315.		5	
2	1.00	14.00	38.19	60.60	14.00	60.60	23.150	321.		7	
13	1.00	11.00	30.62	74.96	10.00	74.83	26.260	313.		8	
14	1.00	17.00	50.60	58.82	17.00	53.91	24.830	288.		5	
	1.00	8.00	35.24	165.8	6.00	115.5	21.460	196.		62	
	1.00	162.00	295.84	16.37	151.00	16.59	20.030	619.		1	STDS
17	1.00	1356.00	2467.91	5.48	1159.00	5.88	15.920	623.		1	STDS
18	1.00	11847.0	21612.3	1.84	10090.0	1.99	15.410	620.		1	STDS
9	0.53	75360.4	115619.	1.00	66713.2	1.06	18.400	908.	E	0	Packard 127,618 dam

90-24
1/4

AREA CONTAMINATION SURVEY SHEET

Radionuclide(s) Surveyed: ^{35}S ^{14}C Date: 5-21-90

Method of Detection: LSC-460

Radiation Safety Technician

Swipe #	Location RM #	Area	Nuclide: NET CPM	NET DPM	~~pCi~~ ~~μCi~~	Nuclide: NET CPM	NET DPM	μCi	
	648	BKGRD	23	—	N/A				
		door	Ø net	Ø net					
		E counter	Ø	Ø net					
		W counter	3	LLD95					
		W counter	0	Ø net					
		Radio	0	Ø net					
		desk	0	Ø net					
		chair	0	Ø net					
		Floor	0	Ø net					
		Floor	7	8	4				
	TERF	WEST DOOR	0	Ø net	N/A				
		FLOOR (DOOR)	1	LLD95					
		Floor (Hall)	4	LLD					
		Work Area Floor	0	Ø net					
		Floor	0	Ø net					

Calculation of Lower Limits of Detection (LLD) Nuclide: _____ Nuclide: _____

Gross Background Counts: 230 _____

Total Background Count time: _____ _____

$$(95\%) = \sqrt{\frac{\text{Gross Background Counts}}{\text{Count Time}}} \times 4.66$$

LLD (95%): 7 _____

REMARKS:

AREA CONTAMINATION SURVEY SHEET

Radionuclide(s) Surveyed:_____ Date:_____

Method of Detection:_____

_____
Radiation Safety Technician

Swipe #	Location RM #	Location Area	Nuclide: NET CPM	NET DPM	µCi	Nuclide: NET CPM	NET DPM	µCi	
	TERF	Work area Floor (SW)	0 net	0 net	N/A				
		"	0	0 net					
		"	0	0 net					
		"	0	0 net					
		"	0	0 net					
		"	1	~~<LLD 0 net~~					
		Between Chamber Floor	1	~~<LLD 0 net~~					
		"	1	~~<LLD 0~~					
		"	10	11	5				
		"	8	9	4				
		Back of chamber 27	21	24	11				
		"	5	<LLD	N/A				
		"	0	0 net					
		Side of chamber 27	0	0 net					
		~~27~~ (21) Front of Chamber	0	0 net					

Calculation of Lower Limits of Detection (LLD) Nuclide:_____ Nuclide:_____

Gross Background Counts: _____ _____

Total Background Count time: _____ _____

$$(95\%) = \sqrt{\frac{\text{Gross Background Counts}}{\text{Count Time}}} \times 4.66$$

LLD (95%)= _____ _____

REMARKS:

AREA CONTAMINATION SURVEY SHEET

Radionuclide(s) Surveyed:_____ Date:_____

Method of Detection:_____

_____
Radiation Safety Technician

Swipe #	Location RM #	Area	Nuclide: NET CPM	NET DPM	µCi	Nuclide: NET CPM	NET DPM	µCi
	TORF	Door Chamber 27	1	<LLD95	N/A			
		Door Chamber 27	0 net	0 net				
		Inside 27	0	0 net				
		"	1	<LLD95				
		"	6	<LLD95				
		"	0	0 net				
		Chair	0	0 net				
		Control Pannel	1	<LLD				
		Control Panel	0	0				
		E Door	0	0				
		E Floor	0	0				
		Restroom ♂	0	0				
		Chamber 14 Door	0	0				
		" Inside Floor	0	0				
		Inside Floor	0	0				

Calculation of Lower Limits of Detection (LLD) Nuclide:_____ Nuclide:_____

Gross Background Counts: _____ _____
Total Background Count time: _____ _____

$$(95\%) = \sqrt{\frac{\text{Gross Background Counts}}{\text{Count Time}}} \times 4.66$$

LLD (95%)= _____ _____

REMARKS:

AREA CONTAMINATION SURVEY SHEET

Radionuclide(s) Surveyed:_____ Date:_____

Method of Detection:_____

_____
Radiation Safety Technician

wipe #	Location RM #	Area	Nuclide: NET CPM	NET DPM	µCi	Nuclide: NET CPM	NET DPM	µCi	
		inside wall	0	∅	N/A				
		Inside wall	0	∅					
		Front Chamb. 14	0	∅					
		Front	1	<LLD					
		control Panel	0	∅					
		Floor	0	∅					
		Floor	0	∅					
		Floor	0	∅					
		Chamber 10 WASTE CAN	1	<LLD					
		WASTE Can 27	0	∅					
		S. Door	0	∅					
		W Wall	0	∅					
		W WALL	0	∅					
		W WALL	0	∅					
		W WALL	3	<LLD$_{95}$	✓				

alculation of Lower Limits of Detection (LLD) Nuclide:_____ Nuclide:_____

Gross Background Counts: _____ _____
Total Background Count time: _____ _____

$$(95\%) = \sqrt{\frac{\text{Gross Background Counts}}{\text{Count Time}}} \times 4.66$$

LD (95%)= _____ _____

REMARKS:

1/3
89-28

AREA CONTAMINATION SURVEY SHEET

Radionuclide(s) Surveyed: Carbon-14 Date: 9-22-89

Method of Detection: LSC 460

Radiation Safety Technician

Swipe #	Location RM #	Area	Nuclide: NET CPM	NET DPM	µCi	Nuclide: NET CPM	NET DPM	µCi
1	~~TERF~~	~~Door~~ BKGRD	24					
2	TERF	DOOR	0					
3		6 E Chamber window	1					
4		SE Chamber door	4					
5		SE Chamber in	0					
6		SE Chamber in	0					
7		Floor	3					
8		Floor	2					
9		Floor	35	40 (L)	ok	< 100 dpm	/100 cm2	
10		SW Chamber window	7	8				
11		SW Chamber door	0					
12		SW Chamber in	0					
13		SW Chamber in	3					
14		~~SW~~ SE Smurf ~~Floor~~	4					
15		SE Smurf	0					

Calculation of Lower Limits of Detection (LLD) Nuclide: ^{14}C Nuclide: ____

Gross Background Counts: 240

Total Background Count time: ____

LLD (95%) = $\sqrt{\frac{\text{Gross Background Counts}}{\text{Count Time}}} \times 4.66$

LLD (95%) = 7

REMARKS:

2/13

AREA CONTAMINATION SURVEY SHEET

Radionuclide(s) Surveyed:_____ Date:_____

Method of Detection:_____

Radiation Safety Technician

Swipe #	Location RM #	Area	Nuclide: NET CPM	NET DPM	µCi	Nuclide: NET CPM	NET DPM	µCi	
16		SE chamber IN	0						
17		SW chamber IN	0						
18		SW SMURF	0						
19		SW SMURF	0						
20		SW chamber W-side out	1						
21		SW Chamber W-Side out	0						
22		SW chamber W-Side out	0						
23		SW FLOOR	0						
24		SW FLOOR	0						
25		SW FLOOR	0						
26		SW DOOR	0						
27		CART	73	(82)	ASK	Clean			
28		CART	0						
29		CHAIR	0						
30		TRANSFORMER	0						

Calculation of Lower Limits of Detection (LLD) Nuclide:_____ Nuclide:_____

Gross Background Counts: _____ _____

Total Background Count time: _____ _____

(95%)= $\sqrt{\frac{\text{Gross Background Counts}}{\text{Count Time}}}$ x 4.66

LLD (95%)= _____ _____

REMARKS:

3/4

AREA CONTAMINATION SURVEY SHEET

Radionuclide(s) Surveyed:_____ Date:_____

Method of Detection:_____

_____
Radiation Safety Technician

Swipe #	Location RM #	Area	Nuclide: NET CPM	NET DPM	µCi	Nuclide: NET CPM	NET DPM	µCi	
31		N Chamber Window #7	0						
32		N chamber Door	0						
33		N chamber IN	0						
34		N C IN	4						
35		N C IN	0						
36		N C OUT	0						
37		N C OUT	0						
38		Floor	2						
39		Floor	0						
40		Floor	0						
41		TRASH CAN	0						
42		Chamber # OUT 14	0						
43		Chair	12	(B)					
44		Chair	0						
45	190	DOOR	0						

Calculation of Lower Limits of Detection (LLD) Nuclide:_____ Nuclide:_____

Gross Background Counts: _____ _____

Total Background Count time: _____ _____

$$(95\%) = \sqrt{\frac{\text{Gross Background Counts}}{\text{Count Time}}} \times 4.66$$

LLD (95%)= _____ _____

REMARKS:

TERF Bays 89-29

OGRAM #: 6
REGION A: LL-UL= 0- 156 LCR= 0 BKG= 0 % 2 SIGMA= 1.0
EGION B: LL-UL= 4- 156 LCR= 0 BKG= 0 % 2 SIGMA= 1.0
NUCLIDE 1 = 42000
IME= 3.00 QIP= SIE/AEC SCR= B/A K= 1.000

S#	TIME	CPMA/K DPM1/K	%DEV	CPMB/K DPM2/K	%DEV	QIP	FLAGS	SCR	MIN	
1	10.00	21.50	13.6	19.70	14.2	662.	B	.916	10	B
2	3.00	288.50	6.56	262.63	6.87	749.	L	.910	15	272 3H
		309.35		.00				.000		
3	3.00	1315.17	3.16	1090.63	3.47	715.	L	.829	18	3H
		1415.14		.00				.000		
4	3.00	12932.8	1.01	10647.6	1.12	729.	L1	.823	22	3H
		13894.9		.00				.000		
5	3.00	1062.83	3.51	1049.97	3.53	718.	L	.988	26	1079 C-14
		1143.29		.00				.000		
6	3.00	10141.8	1.15	10015.9	1.15	713.	L	.988	30	10,790 C-14
		10914.7		.00				.000		
11	3.00	2.17	23.7	.97	25.4	685.		.446	33	B
		2.34		.00				.000		
12	3.00	.00	25.0	.00	26.7	619.	?	.000	37	
		.00		.00				.000		
13	3.00	1.50	24.0	1.63	25.0	499.		1.089	41	
		1.69		.00				.000		
14	3.00	.83	24.4	2.63	24.4	594.		3.160	45	
		.92		.00				.000		
ERROR										
15	3.00	.00	.00	.00	.00	.000	?	.000	49	
		2.08		.00			?	.000		
ERROR										
16	3.00	.00	.00	.00	.00	.000	?	.000	53	
		2.08		.00			?	.000		
ERROR										
17	3.00	.00	.00	.00	.00	.000	?	.000	58	
		2.08		.00			?	.000		
ERROR										
18	3.00	.00	.00	.00	.00	.000	?	.000	62	
		2.08		.00			?	.000		
ERROR										
19	3.00	.00	.00	.00	.00	.000	?	.000	66	
		2.08		.00			?	.000		
ERROR										
20	3.00	.00	.00	.00	.00	.000	?	.000	71	
		2.08		.00			?	.000		

CART re-swipe following cleaning
9-27-89

U.S. Environmental Protection Agency
Western Ecology Division

NRC Radioactive Materials License No. 36-12343-02 Termination and Facility Decommissioning

Date: **November 27, 2004**
Subject: **Room Survey: Willamette Research Station (WRS or WFTS) 10 Final Contamination Survey.**

Description and Historic Use:

Single lab (225 ft^2). Carbon-14 tracer, and nickel-63 and hydrogen-3:scandium sealed sources. No isotope use since prior to 1986. There is no record of leakage of any sealed sources used in this area.

Surveys:

A total (fixed + removable) contamination survey was conducted in WRS 10 in November 2004. All points surveyed (13) demonstrated no contamination. This area meets the contamination criteria for unrestricted use based upon the isotopes used at our facilities. HVAC duct swipes were made in November 2004 which indicated no significant contamination (0.22 Bq/100 cm^2).

Records for this room clearly demonstrate that contamination surveys were regularly performed, the area was not subject to any significant contamination events, and the room was maintained as a contaminate-free area. We determined it was unnecessary to conduct further contamination surveys in this area given these survey results and the Western Ecology Division's historic management of radioactive material use in this area. Records of the most recent historic surveys (i.e. prior to the final decommissioning surveys) of WRS 10 are included in this report.

The survey for total contamination was conducted using a Ludlum Model 2000 Scaler equipped with a Ludlum Model 44-9, 12-cm^2 thin-window Geiger-Muller pancake detector. Removable contamination (duct) was determined using methanol-wetted swipes counted in a Packard 2200 CA dual channel Liquid Scintillation Counter.

NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY

FIXED SURVEY

DATE 11-15-04 LOCATION WRS ROOM 10

INSTRUMENT Ludlum 2000 Scaler Pancake Probe 44-9

SERIAL NO. 83810 / PR070834

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
1	28	<LLD95	ND
2	36	↓	↓
3	34		
4	46		
5	38		
6	34		
7	48		
8	32		
9	36		
10	38		
11	30		
12	32		
13	42		

$LLD_{95} = \left\{\left(\frac{\sqrt{26}}{0.5}\right) \times 2.96\right\}^{53}_{+} = 83$ CPM

BACKGROUND 53 CPM

STANDARD (^{14}C 0.168 μCi 10,540 CPM

Time 0.5' 2.8% eff.

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²

$LLD_{95} = \{(\quad) \times 2.96\} + =$ CPM

BACKGROUND _____

STANDARD ( ) _____

COMMENTS:

R. Monar
RADIATION SPCL.

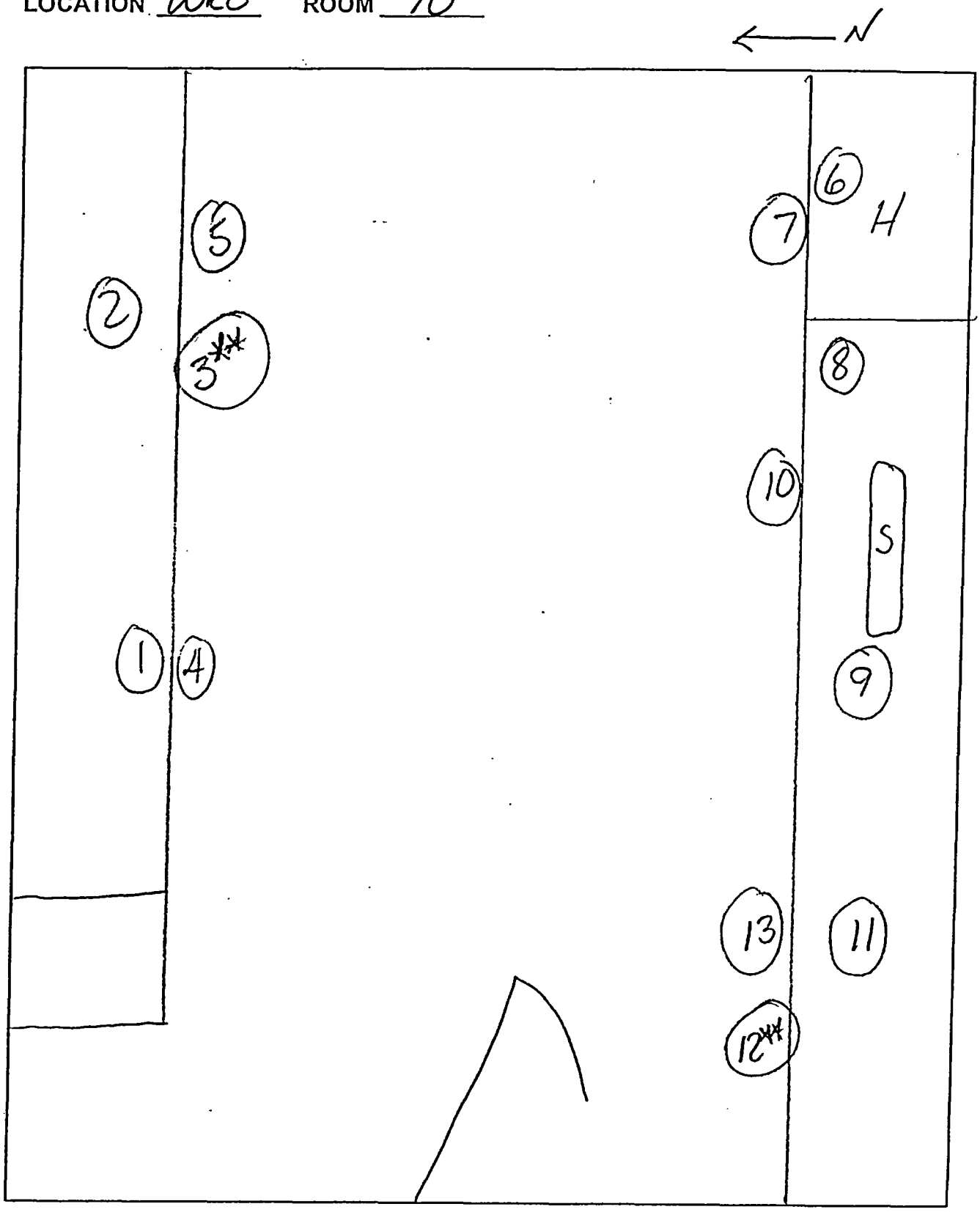
11-16-4
DATE

NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY MAP

LOCATION WRS ROOM 10



10

86-46

WFTS

AREA CONTAMINATION SURVEY SHEET

WFTS

Radionuclide(s) Surveyed: ^{14}C, ^{3}H Date: 9-24-86

Method of Detection: LSC

Q. Monaco
Radiation Safety Technician

Swipe #	Location RM #	Location Area	Nuclide: 3H NET CPM	NET DPM	µCi	Nuclide: 14C NET CPM	NET DPM	µCi	
24	12	SEE MAP	15.9	51.81		14.05	11.06		
25			0			3.05	< LLD		
26			1.30	< LLD		0			
27			0			2.65	< LLD		
28			0			0			
29			0			0			
30			0			0			
31			0			0			
32			0			0			
33			0.7	< LLD		0.85	< LLD		
34			0			1.05	< LLD		
35			0			0			
36			0			0			
37			0			0			

Calculation of Lower Limits of Detection (LLD)

	Nuclide: ^{3}H	Nuclide: ^{14}C
Gross Background Counts:		273
Total Background Count time:		20'

$$\text{LLD (95\%)} = \sqrt{\frac{\text{Gross Background Counts}}{\text{Count Time}}} \times 4.66$$

LLD (95%)=	3.07	3.86

REMARKS:

AREA CONTAMINATION SURVEY SHEET

WFTS

Radionuclide(s) Surveyed: ^{14}C ^{3}H Date: 9/24/02

Method of Detection: LSC

D. Monaco
Radiation Safety Technician

Swipe #	Location RM #	Area	Nuclide: NET CPM	NET DPM	µCi	Nuclide: NET CPM	NET DPM	µCi
	4/4							
38	10	SEE MAP	0			0		
39			0			3.05	3.92	
40			0.5	< LLD		3.25	< LLD	
41			0			0		
42			2.50	10.62		6.25	6.50	
43			0			0		
44			0.1	< LLD		0		
45			0			0		
46	4/4	SEE MAP	0			0		
47			0			0.05	< LLD	
48			0			0.05	< LLD	
49			0			0		
50			0			0		

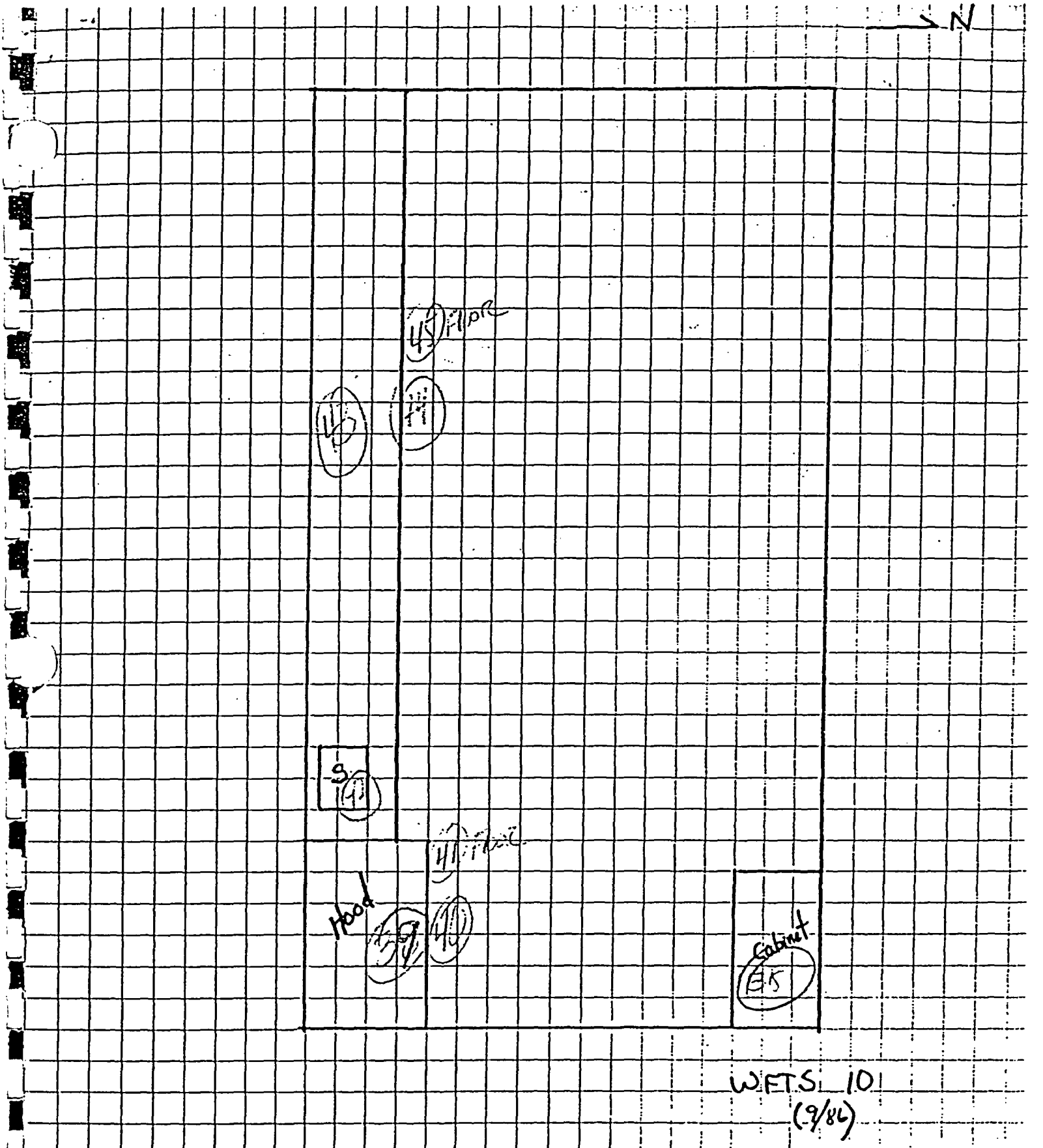
Calculation of Lower Limits of Detection (LLD) Nuclide: _____ Nuclide: _____

Gross Background Counts: _____ _____
Total Background Count time: _____ _____

$$LLD\ (95\%) = \sqrt{\frac{\text{Gross Background Counts}}{\text{Count Time}}} \times 4.66$$

LLD (95%)= _____ _____

REMARKS:



WFTS 10
(9/86)

SL-16

REMOVABLE CONTAMINATION LEVELS (SMEARS)*

Dan Tullo — *Surveyor*

Swipe counts of CERL, and western fish. — *Purpose of Survey*

7/22/82 — *Date*

	1	2	3	4	5	6	7	8
Location	BKG	Gross β cpm w/ ^3H	Net β cpm w/ ^3H	Gross β cpm w/o ^3H	Net β cpm w/o ^3H	Net β μCi w/o ^3H	Net ^3H cpm	Net ^3H μCi
WFTS Rm12 Doorsill	33.6	42.0	<LLD 8.4					<.007
WFTS Rm12 NE floor courner	33.6	38.0	<LLD 4.4					<.007
WFTS Rm12 Book shelves	33.6	43.5	<LLD 9.9					<.007
WFTS Rm12 110 electr strip No. wall	33.6	32.5	<LLD 0.0					<.007
WFTS. Rm10 North wall	33.6	50	<LLD 16.4					<.007
WFTS Rm10 dwr 8	33.6	108.5	74.9					.028
WFTS. Rm10 dwr 20	33.6	38.0	<LLD 4.4					<.007
CERL 266 7/21 oven door interior	33.6	39.5	<LLD 5.9					<.007
CERL 266 oven interior	33.6	57.5	23.9					.009
CERL 266 Lower oven front	33.6	36.5	<LLD 2.9					<.007

* No smearing efficiency value is factored into these results.

HSM

Instrument used: NMC PCC-1IT 054 Rad. cent.

LLD(95%) = 19.1 cpm

LLD(β w/o ^3H) in μCi = _____ μCi

LLD(^3H) in μCi = _____ μCi

Lower Limit of Detection

$4.66 \times \frac{\sqrt{670}}{2}$

η eff = .0012

USE REVERSE SIDE FOR CALCULATIONS

U.S. Environmental Protection Agency
Western Ecology Division

NRC Radioactive Materials License No. 36-12343-02 Termination and Facility Decommissioning

Date: **November 27, 2004**
Subject: **Room Survey: Willamette Research Station (WRS or WFTS) 11 Final Contamination Survey.**

Description and Historic Use:

Single lab (225 ft^2). Carbon-14 and phosphorus-32 tracers, and nickel-63 and hydrogen-3:scandium sealed sources. WRS 11 was decommissioned from restricted use on June 16, 1992. No isotope use since 1992. There is no record of leakage of any sealed sources used in this area.

Surveys:

A total (fixed + removable) contamination survey was conducted in WRS 11 in November 2004. All points surveyed (10) demonstrated no contamination. This area meets the contamination criteria for unrestricted use based upon the isotopes used at our facilities. HVAC duct swipes were made in November 2004 which indicated no significant contamination (0.32 Bq/100 cm^2).

Records for this room clearly demonstrate that contamination surveys were regularly performed, the area was not subject to any significant contamination events, and the room was maintained as a contaminate-free area. We determined it was unnecessary to conduct further contamination surveys in this area given these survey results and the Western Ecology Division's historic management of radioactive material use in this area. Records of the most recent historic surveys (i.e. prior to the final decommissioning surveys) of WRS 11 are included in this report.

The survey for total contamination was conducted using a Ludlum Model 2000 Scaler equipped with a Ludlum Model 44-9, 12-cm^2 thin-window Geiger-Muller pancake detector. Removable contamination (duct) was determined using methanol-wetted swipes counted in a Packard 2200 CA dual channel Liquid Scintillation Counter.

NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY

FIXED SURVEY

DATE 11-15-04 LOCATION WRS ROOM 11

INSTRUMENT Ludlum 2000 Scaler Pancake Probe 44-9

SERIAL NO. 83810 / PR070804

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
1	46	LLD95	ND
2	36	0	0
3	28		
4	28		
5	28		
6	34		
7	26		
8	44		
9	26		
10	30	↓	↓

$LLD_{95} = \left\{\left(\frac{\sqrt{26}}{0.5}\right) \times 2.96\right\}^{53}_{+} = 83$ CPM

BACKGROUND STANDARD (^{14}C 0.168 µCi) 53 CPM / 10,340 CPM

Time 0.5' 2.8% eff

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²

$LLD_{95} = \left\{\left(\text{----------}\right) \times 2.96\right\} + =$ CPM

BACKGROUND STANDARD ( ) _____

COMMENTS:

RADIATION SPCL.

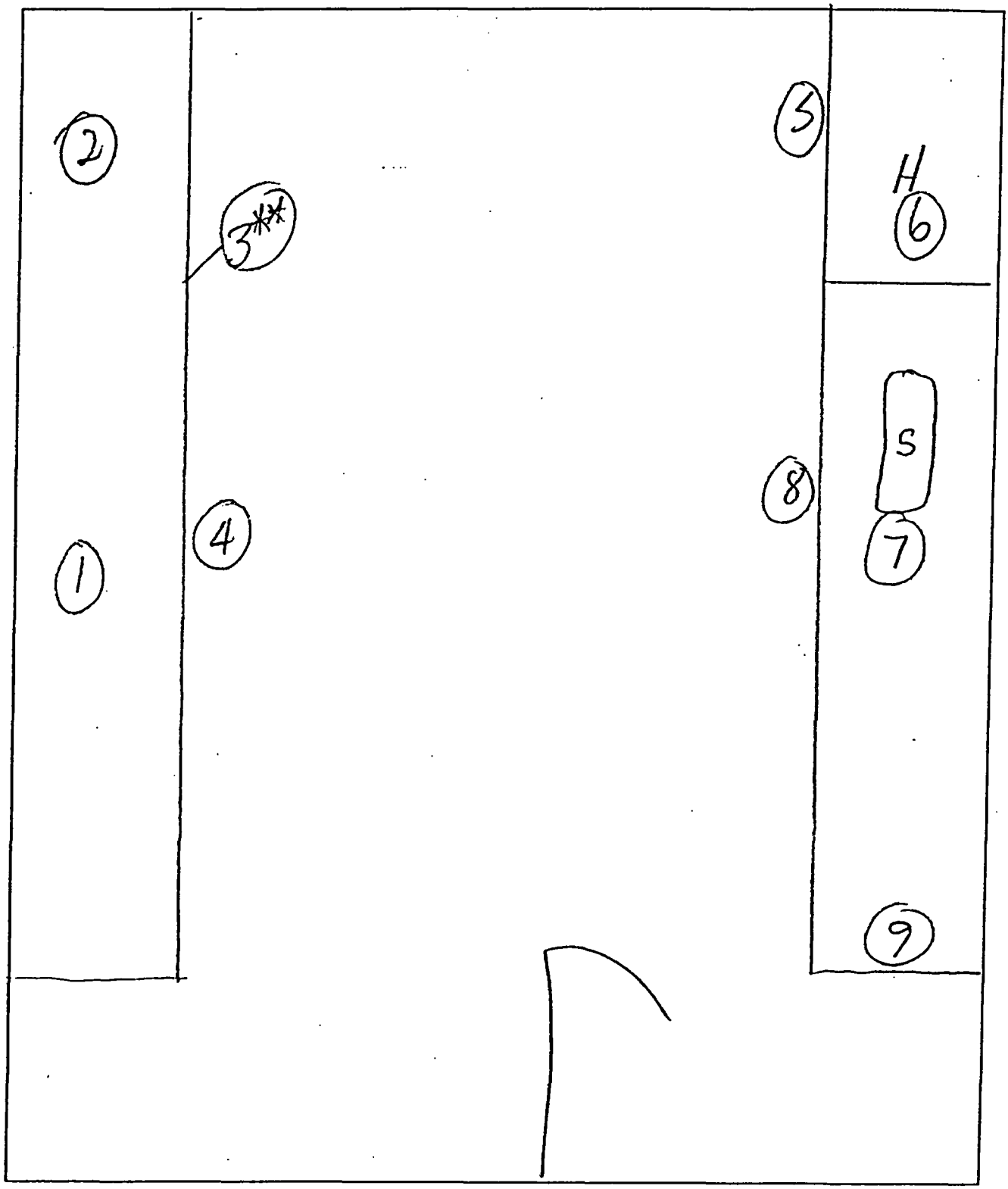
11-16-04
DATE

NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY MAP

LOCATION WRCS ROOM 11



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
ENVIRONMENTAL RESEARCH LABORATORY
200 S.W. 35TH STREET
CORVALLIS, OREGON 97333

MEMORANDUM

TO: File

DATE: June 16, 1992

FROM: Jay D. Gile
Radiation Safety Officer

RE: Decommission of WRS 11

As of June 15, 1992, all radioactive materials and waste have been removed from WRS Radioisotope Lab Room 11. One slightly contaminated instrument (bag sealer) was appropriately bagged and labeled and left in the lab for decay. The laboratory was surveyed and found free of any radioactive contamination.

The authorization to use P-32 (J. Armstrong, 1985) has been deactivated.

cc: L. Watrud
P. Monaco

MANTECH ENVIRONMENTAL TECHNOLOGY , INC
ECOLOGICAL RESEARCH
200 SW 35TH STREET
CORVALLIS, OREGON 97333

M E M O R A N D U M

TO: Jay Gile
ERL-C Radiation Safety Officer

DATE: June 16, 1992

FROM: Phil Monaco P.A. Monaco
Health and Radiation Safety

COPY:

RE: Decommission of WRS 11

On June 15, 1992, I removed all radioactive materials (P-32) waste from WRS lab 11 in preparation for the departure Dr. John Armstrong. Following removal of all materials, all equipment which was used for isotope work, the hood, hood cabinet and the laboratory was surveyed for evidence of contamination.

One piece of equipment (a bag sealer) had slight contamination (200 net cpm) on the inner sealing surface. The sealer was placed in a plastic bag, appropriately labeled with isotope and date, and placed in a drawer. This article does not present a radiation hazard.

Results of the survey demonstrate that the laboratory is free from contamination. All radioactive materials signs and postings were removed from the room.

I recommend that this room, WRS 11, be recognized as a decommissioned radioactive materials laboratory.

Since John will be leaving, it is appropriate that his authorization be deactivated.

Attachment: Survey Results

U.S EPA
ENVIRONMENTAL RESEARCH LABORATORY -CORVALLIS

Log No. _____

RADIATION CONTAMINATION SURVEY

Date: 6-15-92 Type of Survey: Decommissioning SURVEY

Isotope(s): 32P

Gross Background Counts: 125 ± CPM Total Count Time (min.): 1

Lower Limits of Detection: $(\sqrt{125})3 = LLD_{95} = 34$ cpm net = cpm

Instrument Used: ☐ GFPC ☐ LSC ☐ Ion Chamber ☐ Scintillation ☑ GM Model: Ludlum #3 S/N: 77207

Background: 125 CPM±SD DPM±SD ~~Standard~~ (check source): 17,000 dpm ~~± Error~~

Swipe No.	Room No.	Swipe Description	Nuclide: ~~β~~ β (32P) per 100 cm² CPM±SD	Net DPM	Net Activity	Nuclide: per 100 cm² CPM±SD	Net DPM	Net Activity
		Scissors	Ø		-			
		Filtration unit	Ø					
		Shield 1	Ø					
		Shield 2	Ø					
		Shield 3	Ø					
		Forceps	Ø					
		bag sealer	200					
		floor	Ø					
		cabinet	Ø					
		hood	Ø					
		counters	Ø					
		phone	Ø					

Comments: All areas free of radioactive contamination with the exception of the bag sealer.

Rhys A Morris 6/15/92
Radiation Safety Date

(9/70)

U.S. Environmental Protection Agency
Western Ecology Division

NRC Radioactive Materials License No. 36-12343-02 Termination and Facility Decommissioning

Date: **November 27, 2004**
Subject: **Room Survey: Willamette Research Station (WRS or WFTS) 12 Final Contamination Survey.**

Description and Historic Use:

Single lab (225 ft^2). Carbon-14 tracer, and nickel-63 and hydrogen-3:scandium sealed sources. No isotope use since prior to 1986. There is no record of leakage of any sealed sources used in this area.

Surveys:

Total (fixed + removable) and removable contamination surveys were conducted in WRS 12 in November 2004. All points surveyed (12 total and 12 removable) demonstrated no significant contamination. Seven swipes points indicated very low levels of removable contamination from tritium (0.18 – 0.46 Bq/100 cm^2). This area meets the contamination criteria for unrestricted use based upon the isotopes used at our facilities. HVAC duct swipes were made in November 2004 which indicated no significant contamination (0.35 Bq/100 cm^2).

Records for this room clearly demonstrate that contamination surveys were regularly performed, the area was not subject to any significant contamination events, and the room was maintained as a contaminate-free area. We determined it was unnecessary to conduct further contamination surveys in this area given these survey results and the Western Ecology Division's historic management of radioactive material use in this area. Records of the most recent historic surveys (i.e. prior to the final decommissioning surveys) of WRS 12 are included in this report.

The survey for total contamination was conducted using a Ludlum Model 2000 Scaler equipped with a Ludlum Model 44-9, 12-cm^2 thin-window Geiger-Muller pancake detector. Removable contamination was determined using methanol-wetted swipes counted in a Packard 2200 CA dual channel Liquid Scintillation Counter

NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY

FIXED SURVEY

DATE 11-15-04 LOCATION WRS ROOM 12

INSTRUMENT Ludlum 2000 Scaler Pancake Probe 44-9

SERIAL NO. 83810 / PR070834

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
1	32	LLD95	ND
2	28		
3	24		
4	40		
5	36		
6	32		
7	38		
8	58		
9	36		
10	46		
11	32		
12	32		

$LLD_{95} = \left\{\left(\frac{\sqrt{26}}{0.5}\right) \times 2.96\right\}^{53}_{+} = 83$ CPM

BACKGROUND STANDARD (1/4C 0.168 µCi) 53 CPM 10,340 CPM

Time = 0.5 min. 2.8% eff.

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²

$LLD_{95} = \left\{\left(\text{--------}\right) \times 2.96\right\} + =$ CPM

BACKGROUND STANDARD ( ) _____

COMMENTS:

RADIATION SPCL.

11-16-04
DATE

NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY

DATE 11-15-04 LOCATION LWRS ROOM 12

INSTRUMENT Packard LSC 2200 CA

SERIAL NO. #36755

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
1	3	LLD95	ND
2	11	28	0.46
3	8	15	0.25
4	10	25	0.42
5	6	LLD95	ND
6	6	LLD95	ND
7	8	17	0.28
8	7	15	0.25
9	7	18	0.30
10	4	LLD95	ND
11	7	11	0.18

$LLD_{95} = \{(\text{---------}) \times 2.96\} + (= 7 \text{ CPM})$

BACKGROUND STANDARD (^3H) 4 CPM / 64,179 dpm — 56,056 dpm — 87% eff

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
	16	LLD95	ND
	15		
	17		
	16		
	15		
	14		
	16		
	16		
	17		
	17		
	17		

$LLD_{95} = \{(\text{---------}) \times 2.96\} + (= 30 \text{ CPM})$

BACKGROUND STANDARD (^{14}C 84,000 cpm) 22 CPM — 85,603 dpm — 102% eff

COMMENTS:

Mona
RADIATION SPCL.

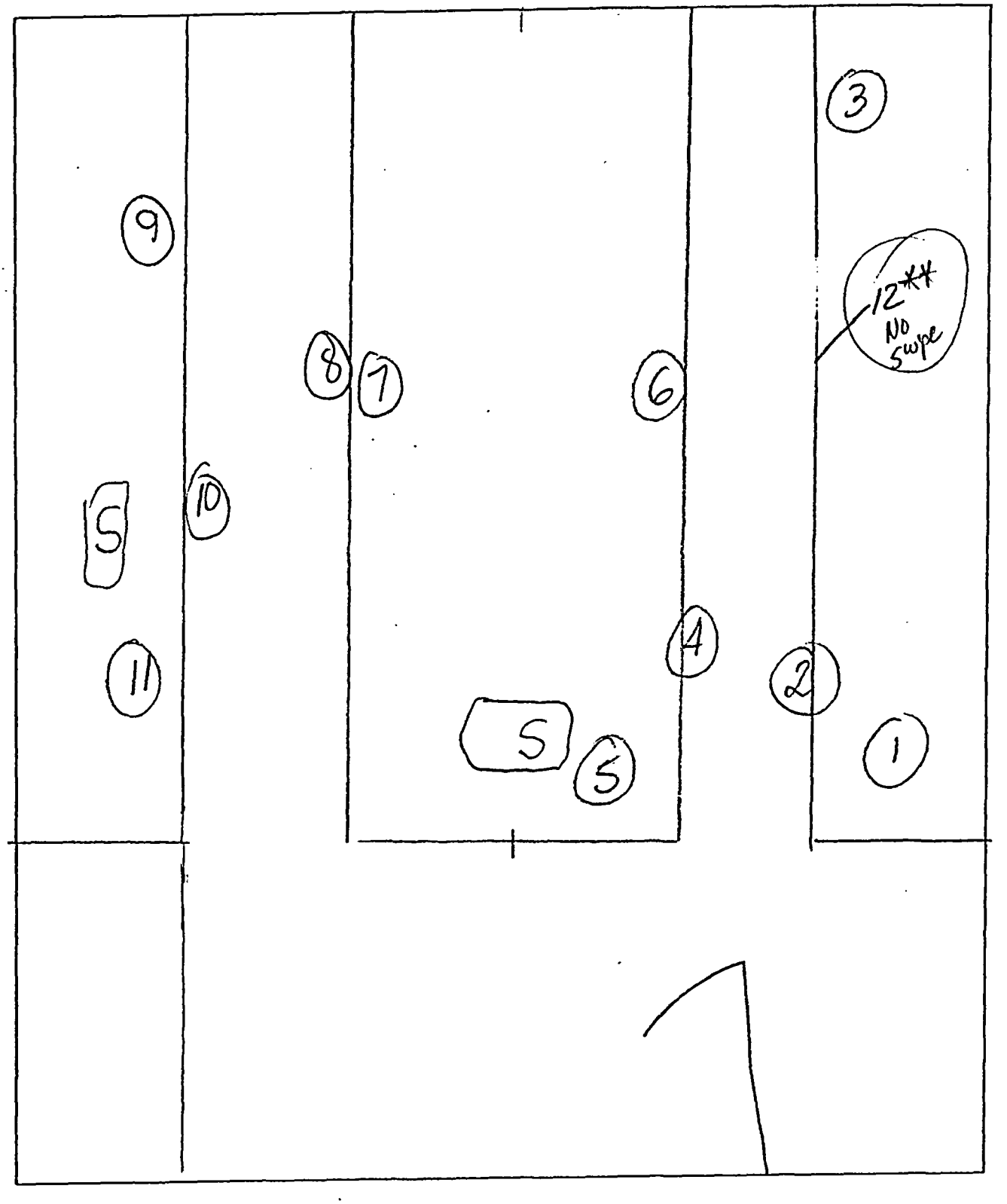
11-18-04
DATE

NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY MAP

LOCATION WRS ROOM 12



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86-46

WFTS

AREA CONTAMINATION SURVEY SHEET

WFTS

Radionuclide(s) Surveyed: ^{14}C, ^{3}H Date: 9-24-86

Method of Detection: LSC

Q. Monaco
Radiation Safety Technician

Swipe #	Location RM #	Location Area	Nuclide: 3H NET CPM	NET DPM	µCi	Nuclide: 14C NET CPM	NET DPM	µCi
24	12	SEE MAP	15.9	51.81		14.05	11.06	
25			0			3.05	< LLD	
26			1.30	< LLD		0		
27			0			2.65	< LLD	
28			0			0		
29			0			0		
30			0			0		
31			0			0		
32			0			0		
33			0.7	< LLD		0.85	< LLD	
34			0			1.05	< LLD	
35			0			0		
36			0			0		
37			0			0		

Calculation of Lower Limits of Detection (LLD)

	Nuclide: 3H	Nuclide: 14C
Gross Background Counts:		275
Total Background Count time:		20'

$$(95\%) = \sqrt{\frac{\text{Gross Background Counts}}{\text{Count Time}}} \times 4.66$$

LD (95%) =	3.0	38

REMARKS:

AREA CONTAMINATION SURVEY SHEET

WFTS

Radionuclide(s) Surveyed: ^{14}C ^{3}H Date: 9/24/86

Method of Detection: LSC

D. Monaco
Radiation Safety Technician

Swipe #	Location RM #	Area	Nuclide: NET CPM	NET DPM	µCi	Nuclide: NET CPM	NET DPM	µCi	
	#4								
38	10	SEE MAP	0			0			
39			0			3.05	3.92		
40			0.5	< LLD		3.25	< LLD		
41			0			0			
42			2.50	10.62		6.25	6.50		
43			0			0			
44			0.1	< LLD		0			
45			0			0			
46	4	SEE MAP	0			0			
47			0			0.05	< LLD		
48			0			0.05	< LLD		
49			0			0			
50			0			0			

Calculation of Lower Limits of Detection (LLD) Nuclide: _____ Nuclide: _____

Gross Background Counts: _____ _____
Total Background Count time: _____ _____

$$\text{LLD (95\%)} = \sqrt{\frac{\text{Gross Background Counts}}{\text{Count Time}}} \times 4.66$$

LLD (95%)= _____ _____

REMARKS:

SL-16

REMOVABLE CONTAMINATION LEVELS (SMEARS)*

Dan Tullo	Swipe counts of CERL, And western fish.	7/22/82
Surveyor	*Purpose of Survey*	*Date*

Location	1 BKG	2 Gross β cpm w/^{3}H	3 Net β cpm w/^{3}H	4 Gross β cpm w/o ^{3}H	5 Net β cpm w/o ^{3}H	6 Net β μCi w/o ^{3}H	7 Net ^{3}H cpm	8 Net ^{3}H μCi
WFTS Rm 12 Doorsill	33.6	42.0	<LLD 8.4					<.007
WFTS Rm 12 NE floor corner	33.6	38.0	<LLD 4.4					<.007
WFTS Rm 12 Book shelves	33.6	43.5	<LLD 9.9					<.007
WFTS R12 110 elect strip No. wall	33.6	32.5	<LLD 0.0					<.007
WFTS. Rm 10 North wall	33.6	50	<LLD 16.4					<.007
WFTS Rm 10 dwr 8	33.6	108.5	74.9					.028
WFTS. Rm 10 dwr 20	33.6	38.0	<LLD 4.4					<.007
CERL 266 7/21 oven door interior	33.6	39.5	<LLD 5.9					<.007
CERL 266 oven interior	33.6	57.5	23.9					.009
CERL 266 Lower oven front	33.6	36.5	<LLD 2.9					<.007

* No smearing efficiency value is factored into these results.

H eff.

Instrument used: NMC PCC-11T OSU Rad. cent.

Lower Limit of Detection

LLD(95%) = 19.1 cpm

$4.66 \times \frac{\sqrt{67.2}}{2}$

LLD(β w/o ^{3}H) in μCi = ______ μCi

H eff. = .0012

LLD(^{3}H) in μCi = ______ μCi

USE REVERSE SIDE FOR CALCULATIONS

U.S. Environmental Protection Agency
Western Ecology Division

NRC Radioactive Materials License No. 36-12343-02 Termination and Facility Decommissioning

Date: **November 27, 2004**
Subject: **Room Survey: Willamette Research Station (WRS or WFTS) 43 Final Contamination Survey.**

Description and Historic Use:

Exposure room (225 ft^2). Carbon-14 tracer. No isotope use since prior to 1986.

Surveys:

A total (fixed + removable) contamination surveys was conducted in WRS 43 in November 2004. All points surveyed (5) demonstrated no contamination. This area meets the contamination criteria for unrestricted use based upon the isotopes used at our facilities

Records for this room clearly demonstrate that contamination surveys were regularly performed, the area was not subject to any significant contamination events, and the room was maintained as a contaminate-free area. We determined it was unnecessary to conduct further contamination surveys in this area given these survey results and the Western Ecology Division's historic management of radioactive material use in this area.

The survey for total contamination was conducted using a Ludlum Model 2000 Scaler equipped with a Ludlum Model 44-9, 12-cm^2 thin-window Geiger-Muller pancake detector.

NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY

FIXED SURVEY

DATE 11-15-04 LOCATION WRS ROOM 43

INSTRUMENT Ludlum 2000 Scaler Pancake Probe 44-9

SERIAL NO. 83810 / PR070834

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
1	46	<LLD95	ND
2	50		
3	54		
4	28		
5	24		

$LLD_{95} = \left\{ \left(\frac{\sqrt{26}}{0.5} \right) \times 2.96 \right\} \frac{53}{+} = 83$ CPM

BACKGROUND STANDARD (^{14}C 0.68 µCi) 53 CPM / 10,540 CPM

28% eff

Time = 0.5'

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²

$LLD_{95} = \left\{ \left(\text{-------} \right) \times 2.96 \right\} + =$ CPM

BACKGROUND STANDARD ( ) _____

COMMENTS:

RADIATION SPCL.

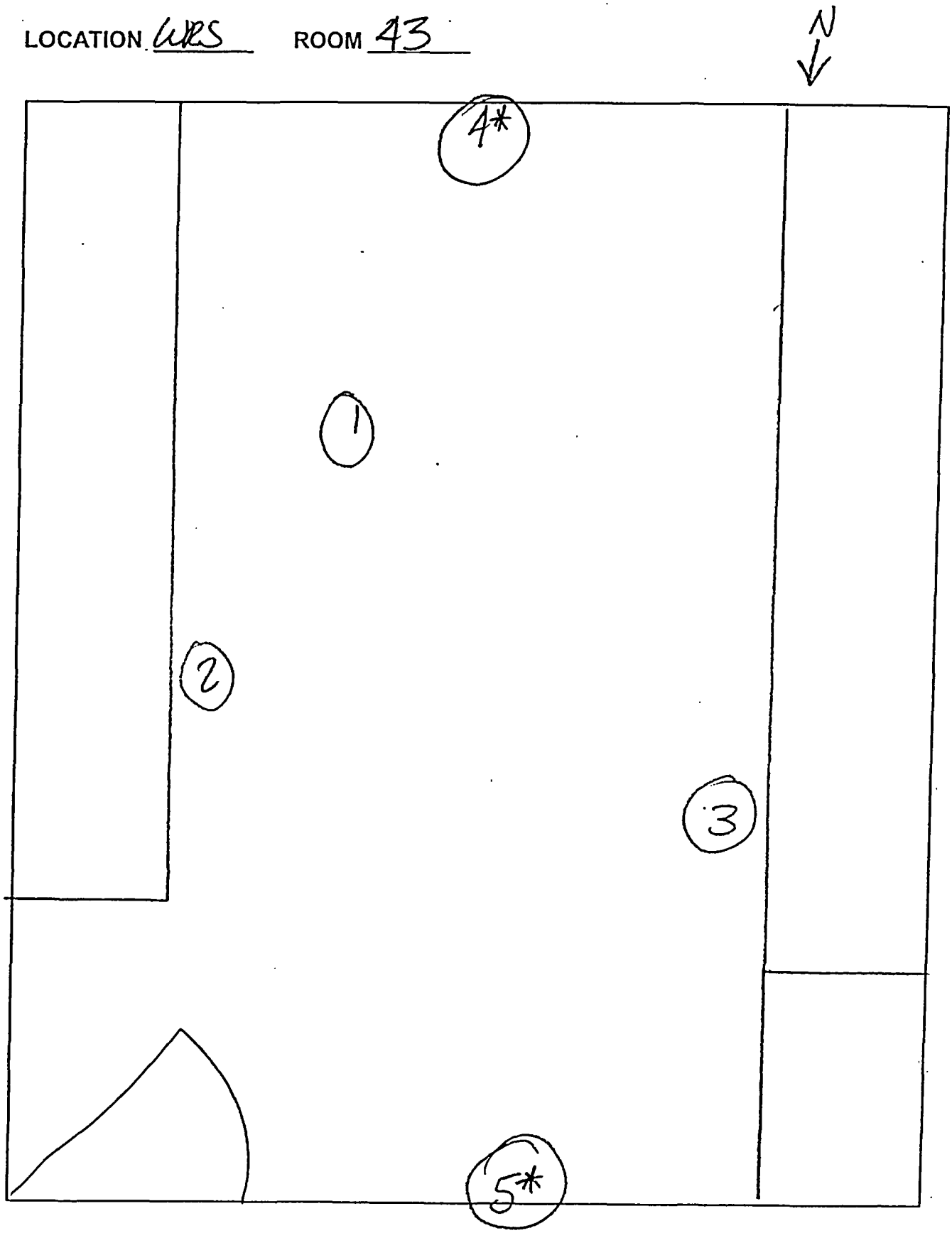
11-16-04
DATE

NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY MAP

LOCATION URS ROOM 43



U.S. Environmental Protection Agency
Western Ecology Division

NRC Radioactive Materials License No. 36-12343-02 Termination and Facility Decommissioning

Date: **November 27, 2004**
Subject: **Room Survey: Willamette Research Station (WRS or WFTS) 44 Final Contamination Survey.**

Description and Historic Use:

Exposure room (225 ft^2). Carbon-14 tracer. No isotope use since prior to 1986.

Surveys:

A total (fixed + removable) contamination surveys was conducted in WRS 44 in November 2004. All points surveyed (7) demonstrated no contamination. This area meets the contamination criteria for unrestricted use based upon the isotopes used at our facilities

Records for this room clearly demonstrate that contamination surveys were regularly performed, the area was not subject to any significant contamination events, and the room was maintained as a contaminate-free area. We determined it was unnecessary to conduct further contamination surveys in this area given these survey results and the Western Ecology Division's historic management of radioactive material use in this area. Records of the most recent historic surveys (i.e. prior to the final decommissioning surveys) of WRS 44 are included in this report.

The survey for total contamination was conducted using a Ludlum Model 2000 Scaler equipped with a Ludlum Model 44-9, 12-cm^2 thin-window Geiger-Muller pancake detector.

NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY

FIXED SURVEY

DATE 11-15-04 LOCATION WRS ROOM 44

INSTRUMENT Ludlum 2000 Scaler Pancake Probe 44-9

SERIAL NO. 83810 / PR070834

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²
1	34	LLD95	ND
2	42	↓	↓
3	42		
4	38		
5	44		
6	28		
7	30		

$LLD_{95} = \{(\sqrt{26} / 0.5) \times 2.96\} + 53 =$ 83 CPM

BACKGROUND STANDARD (^{14}C 0.168 μCi) 53 CPM / 10540 CPM

2.8 % Eff

Time = 0.5'

SWIPE #	GROSS CPM	NET DPM	ACTIVITY Bq/100 CM²

$LLD_{95} = \{(\quad) \times 2.96\} + \quad =$ CPM

BACKGROUND STANDARD ( )

COMMENTS:

Q Monaco
RADIATION SPCL.

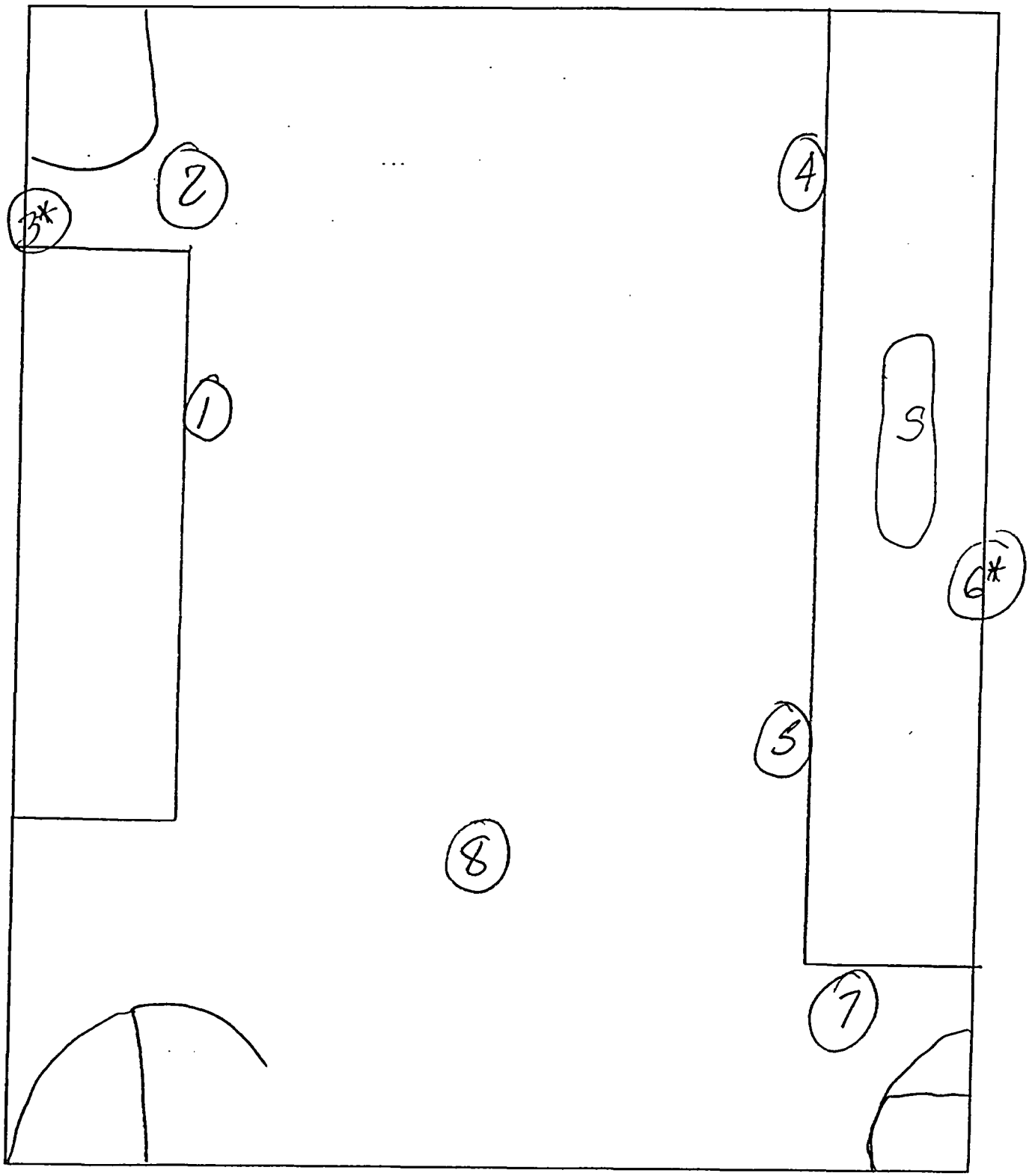
11-16-04
DATE

NHEERL-WED

LOG NO. 04-23

RADIATION AREA SURVEY MAP

LOCATION WRS ROOM 44



86-46

WFTS

AREA CONTAMINATION SURVEY SHEET

WFTS

Radionuclide(s) Surveyed: ^{14}C, ^{3}H Date: 9-24-86

Method of Detection: LSC

Q. Monaco
Radiation Safety Technician

Swipe #	Location RM #	Location Area	Nuclide: 3H NET CPM	NET DPM	µCi	Nuclide: 14C NET CPM	NET DPM	µCi
24	12	SEE MAP	15.9	51.81		14.05	11.06	
25			0			3.05	< LLD	
26			1.30	< LLD		0		
27			0			2.65	< LLD	
28			0			0		
29			0			0		
30			0			0		
31			0			0		
32			0			0		
33			0.7	< LLD		0.85	< LLD	
34			0			1.05	< LLD	
35			0			0		
36			0			0		
37			0			0		

Calculation of Lower Limits of Detection (LLD)

	Nuclide: 3H	Nuclide: 14C
Gross Background Counts:		275
Total Background Count time:		20'

$$LLD\ (95\%) = \frac{\sqrt{\text{Gross Background Counts}}}{\text{Count Time}} \times 4.66$$

LLD (95%)=	3.0	38

REMARKS:

AREA CONTAMINATION SURVEY SHEET

WFTS

Radionuclide(s) Surveyed: ^{14}C ^{3}H Date: 9/24/86

Method of Detection: LSC

D. Monaco
Radiation Safety Technician

Swipe #	Location RM #	Area	Nuclide: NET CPM	NET DPM	µCi	Nuclide: NET CPM	NET DPM	µCi
	4/4							
38	10	SEE MAP	0			0		
39			0			3.05	3.92	
40			0.5	< LLD		3.25	< LLD	
41			0			0		
42			2.50	10.62		6.25	6.50	
43			0			0		
44			0.1	< LLD		0		
45			0			0		
46	4/4	SEE MAP	0			0		
47			0			0.05	< LLD	
48			0			0.05	< LLD	
49			0			0		
50			0			0		

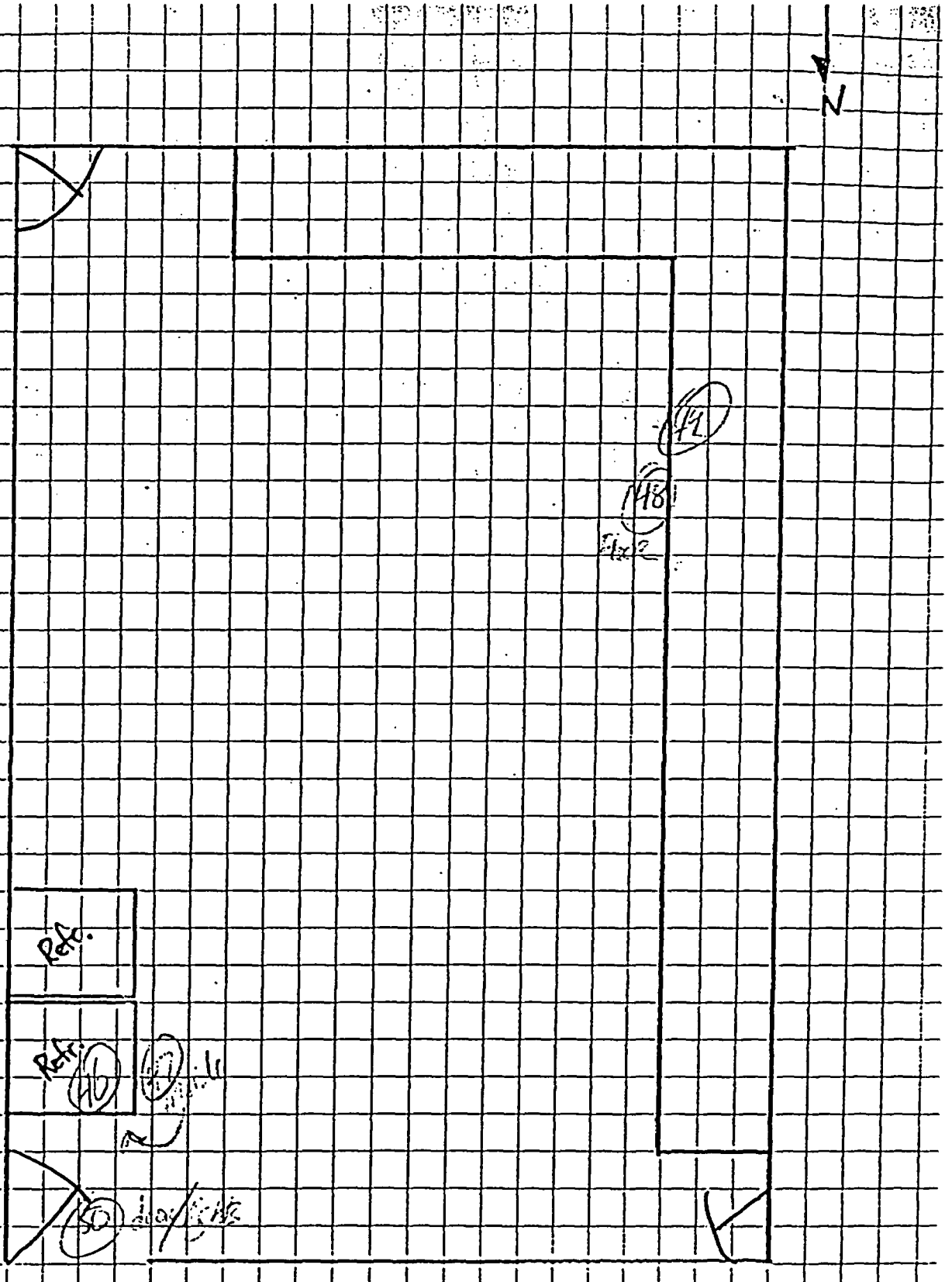
Calculation of Lower Limits of Detection (LLD) Nuclide: _____ Nuclide: _____

Gross Background Counts: _____ _____
Total Background Count time: _____ _____

$$\text{D (95\%)} = \sqrt{\frac{\text{Gross Background Counts}}{\text{Count Time}}} \times 4.66$$

LLD (95%)= _____ _____

REMARKS:



WETS 44
(9/86)

Spcl. Exhaust Air + Pipe

NHEERL-WED

LOG NO. 04-24 1/2

RADIATION AREA SURVEY

DATE 11-15-04 LOCATION _____ ROOM _____ INSTRUMENT Packard LSC 2200CA SN Ø36755

		Isotope 3H			Isotope 14C		
Swipe No.	Description	Gross CPM	Net DPM	Activity Bq/100 cm²	Gross CPM	Net DPM	Activity Bq/100 cm²
	190 Sink	1634	6202		4923	7327	
	190 Vent, Exhaust	8	<LLD95	ND	38	22	
	CSB 1 Vent, Exhaust	3	<LLD95		24	<LLD95	
	TERF 113 VENT, Exhaust	7	<LLD95		31	22	
	WRS 10 VENT, Exhaust	9	<LLD95		35	13	
	WRS 11 VENT, Exhaust	7	<LLD95		37	19	
	WRS 12 VENT, Exhaust	2	<LLD95		36	21	
	MB 126 VENT, Exhaust	10	<LLD95		36	22	
	MB 130 VENT, Exhaust	8	<LLD95		41	28	
	MB 132 VENT, Exhaust	12	Ø	ND	54	50	
	MB 138 VENT, Exhaust	13	89		41	33	
	MB 228 VENT, Exhaust	7	<LLD95	ND	38	25	
		$LLD_{95}=\{(\frac{\sqrt{9}}{3}) \times 2.96\} + = (12 \text{ CPM})$ BACKGROUND 9 CPM COUNT TIME 3 min STANDARD (64,179 DPM) 56,106 87% off			$LLD_{95}=\{(\frac{\sqrt{27}}{3}) \times 2.96\} + = (32 \text{ CPM})$ BACKGROUND 27 COUNT TIME 3 min STANDARD (84,000 DPM) 85,392 102% off		

Comments:

Radiation Safety Specialist

11-29-04

Date

NHEERL-WED
RADIATION AREA SURVEY

LOG NO. 04-24
2/2

DATE 11-15-04 LOCATION _____ ROOM _____ INSTRUMENT _____ SN _____

		Isotope _____			Isotope _____		
Swipe No.	Description	Gross CPM	Net DPM	Activity Bq/100 cm²	Gross CPM	Net DPM	Activity Bq/100 cm²
	MB 246 VENT, Exhaust	7	<LLD95	ND	31	<LLD95	ND
	MB 256 VENT, Exhaust	4	<LLD95		39	27	
	MB 258 Vent, ExhausT	5	<LLD95		27	<LLD95	ND
	MB 266 Vent, ExhausT	8	<LLD95		31	<LLD95	ND
	MB 270 Vent, Exhaust	10	<LLD95		47	41	
		LLD_{95}={(---------) X 2.96} + = CPM BACKGROUND _____ COUNT TIME _____ STANDARD ( ) _____			LLD_{95}={(---------) X 2.96} + = CPM BACKGROUND _____ COUNT TIME _____ STANDARD ( ) _____		

Comments:

O Maria 11-29-04
Radiation Safety Specialist Date

NHEERL-WED
RADIATION AREA SURVEY

LOG NO. 04-25

DATE 11-29-04 LOCATION _____ ROOM _____ INSTRUMENT Packard 2200 CA SN Ø36755

		Isotope 3H			Isotope 14C		
Swipe No.	Description	Gross CPM	Net DPM	Activity Bq/100 cm²	Gross CPM	Net DPM	Activity Bq/100 cm²
1	HVAC exhaust TERF 105	5	< LLD95	ND	36	3	0.05
2	HVAC Exhaust MB 284	3	< LLD95	ND	33	Ø	Ø
	Background						

$LLD_{95} = \left(\left(\frac{\sqrt{15}}{3}\right) \times 2.96\right) + = 9$ CPM

BACKGROUND 5 CPM
COUNT TIME 3'
STANDARD (^3H 64,179 dpm) 60,024 dpm

$LLD_{95} = \left(\left(\frac{\sqrt{24 \times 3}}{3}\right) \times 2.96\right) + = 32$ CPM

BACKGROUND 24 CPM
COUNT TIME 3'
STANDARD (^{14}C 84,000 dpm) 83,008 dpm

Comments:

O A Moran
Radiation Safety Specialist

11-29-04
Date

04-

LOG NO. 24-

NHEERL-WED
RADIATION AREA SURVEY

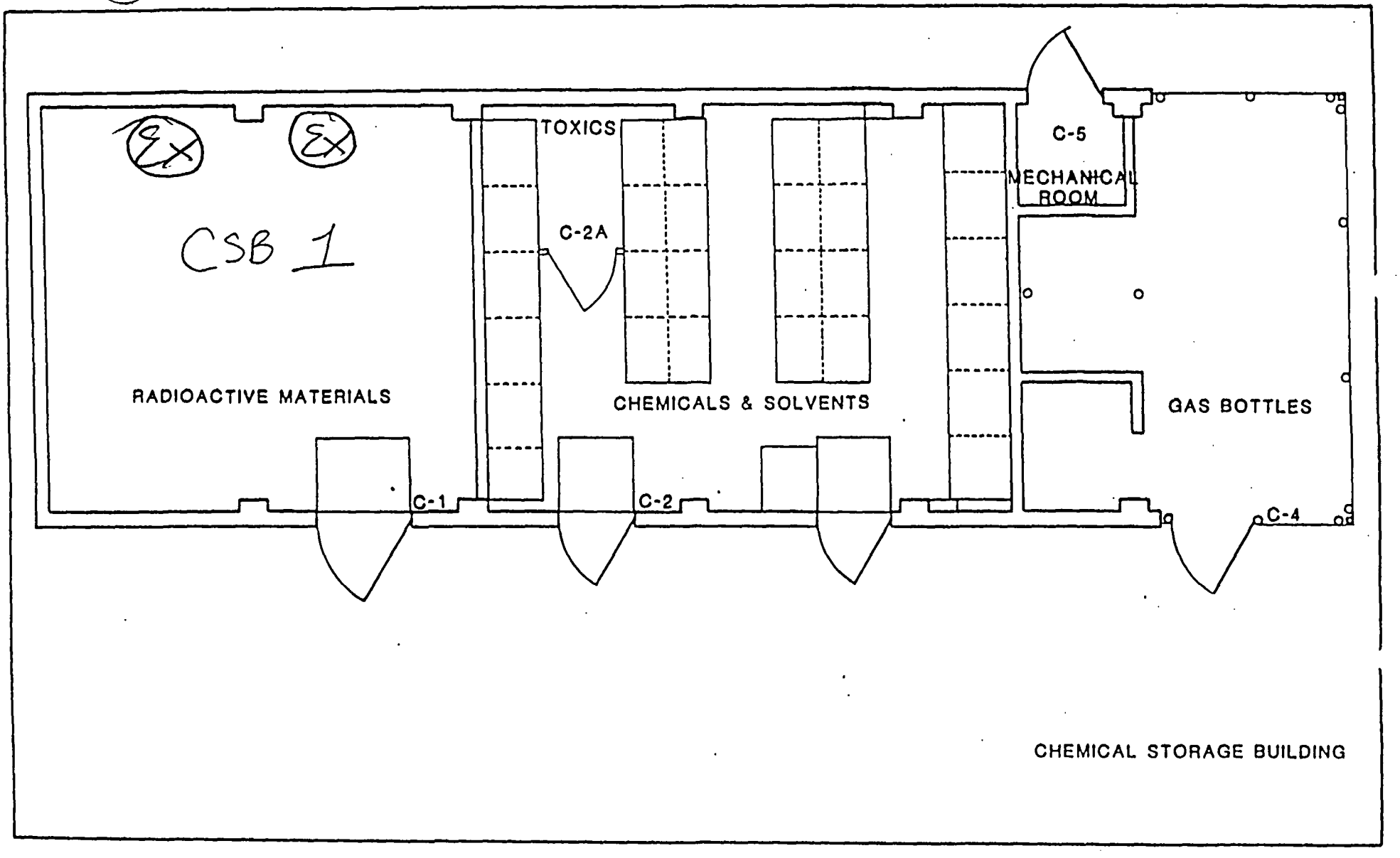
DATE 11-17-04 LOCATION MB ROOM 190 INSTRUMENT Packard LSC 2200 CA SN Ø36755

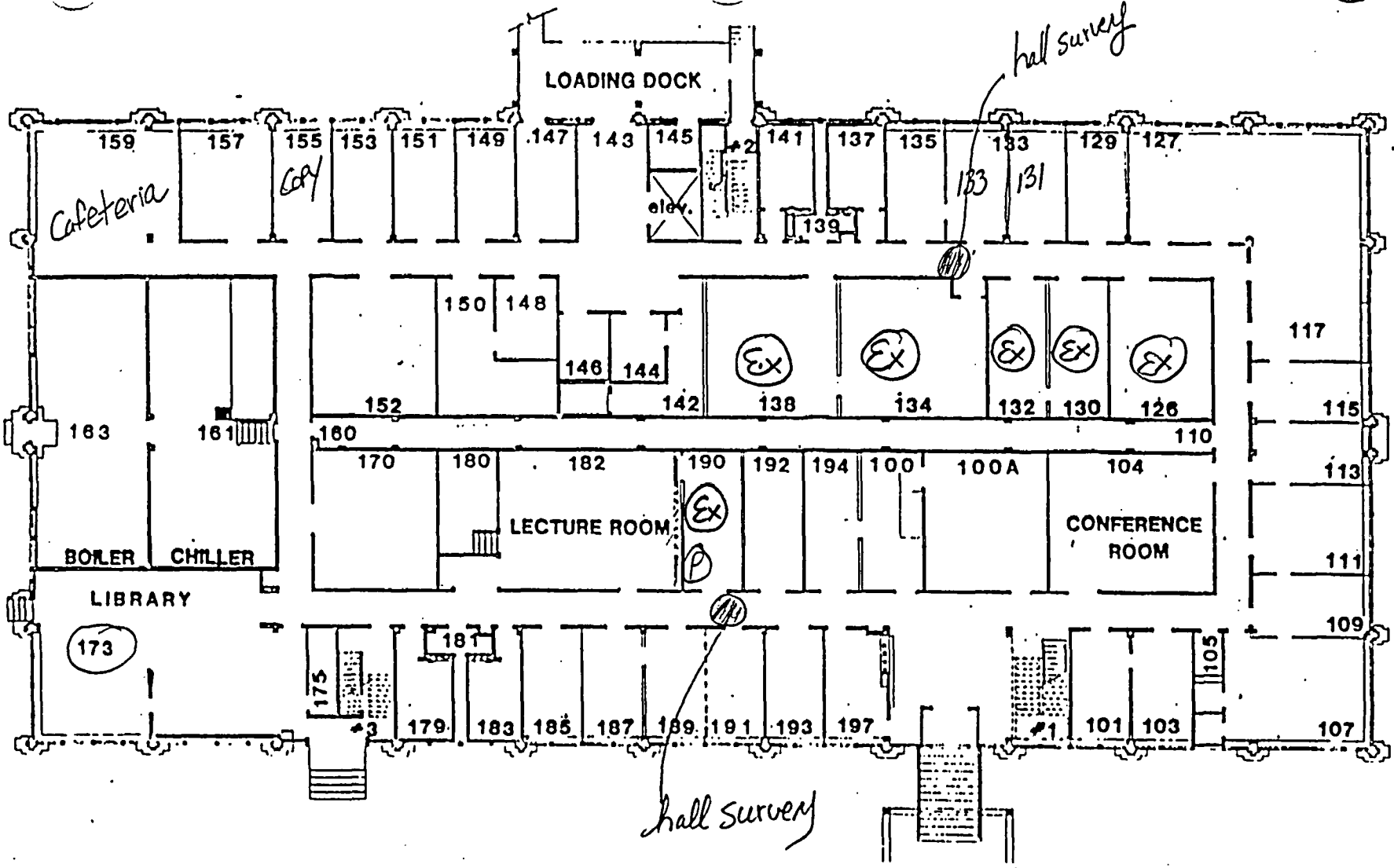
		Isotope ^{3}H			Isotope ^{14}C		
Swipe No.	Description	Gross CPM	Net DPM	Activity Bq/100 cm²	Gross CPM	Net DPM	Activity Bq/100 cm²
1	190 DRAIN PIPE - SINK						
R2	190 DRAIN PIPE - SINK	258	357	5.95	1,124	1,695	28.25
R3	190 DRAIN PIPE - SINK	125	208	3.47	522	735	12.25
		$LLD_{95}=((\frac{\sqrt{27}}{3}) \times 2.96) + 9 =$ 14 CPM			$LLD_{95}=((\frac{\sqrt{105}}{3}) \times 2.96) + =$ 45 CPM		
		BACKGROUND 9 CPM			BACKGROUND 35 CPM		
		COUNT TIME 3'			COUNT TIME 3'		
		STANDARD (^{3}H 69,179 dpm) 56,084 dpm			STANDARD (^{14}C 89,000 dpm) 85,310 dpm		
		87% eff			102% eff		

Comments:

Q Mora
Radiation Safety Specialist

11-29-04
Date

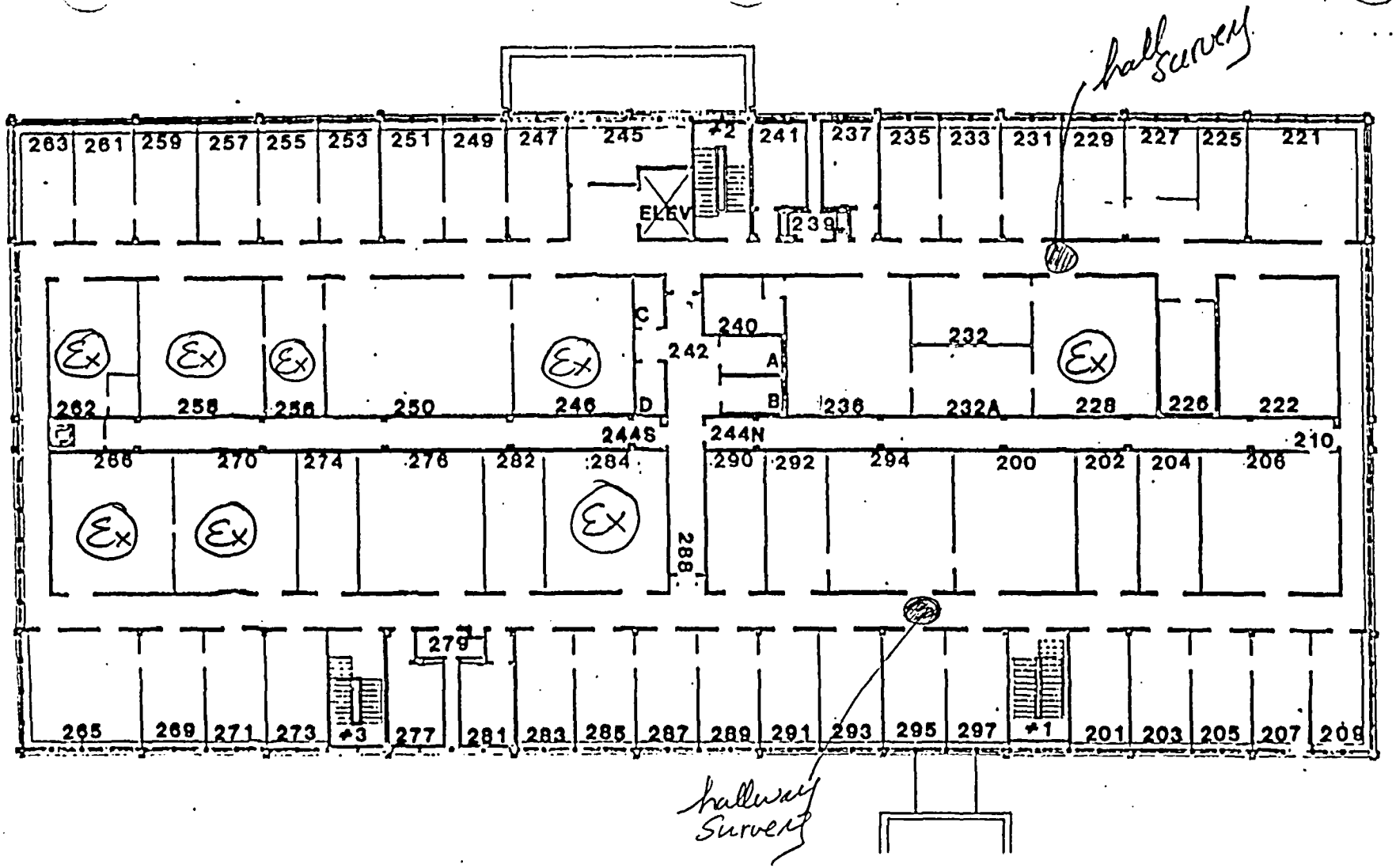

Ex
Ex
CSB 1
TOXICS
C-2A
C-5
MECHANICAL ROOM
RADIOACTIVE MATERIALS
CHEMICALS & SOLVENTS
GAS BOTTLES
C-1
C-2
C-4
CHEMICAL STORAGE BUILDING



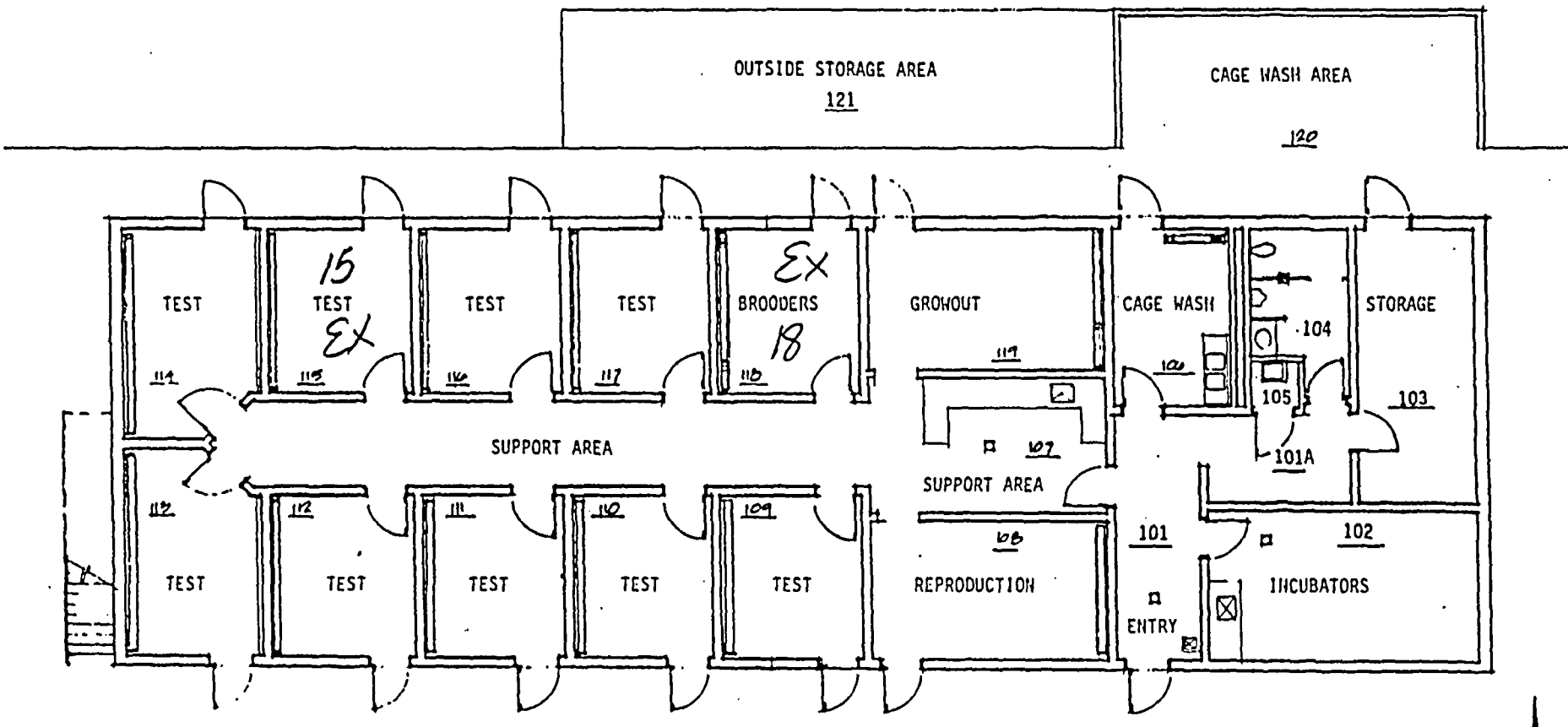
MAIN BUILDING, FIRST FLOOR

(P) ≡ Pipe/DRAIN Survey

(Ex) ≡ HVAC Exhaust Survey

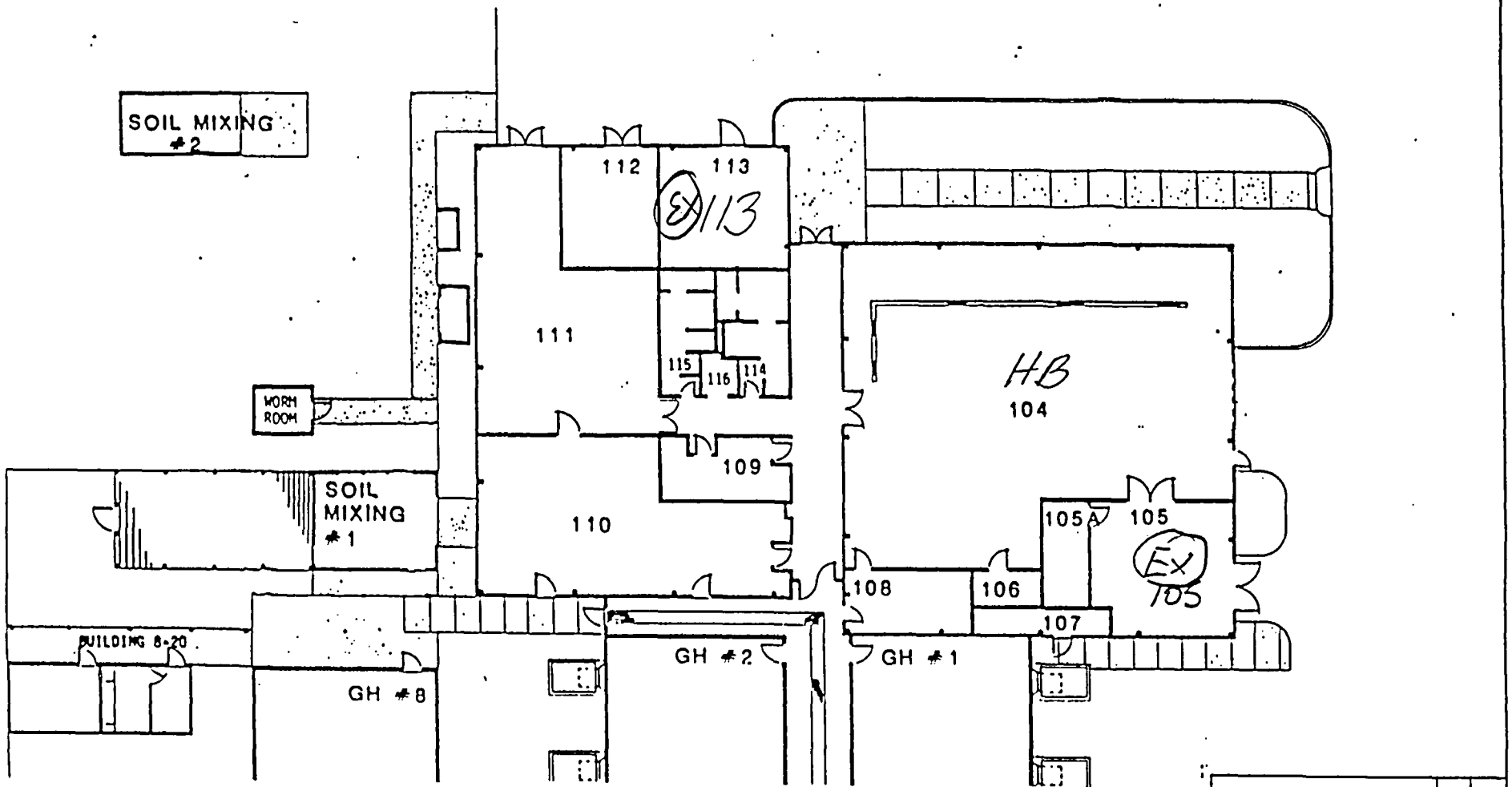


MAIN BUILDING, SECOND FLOOR



WILDLIFE TOXICOLOGY FACILITY

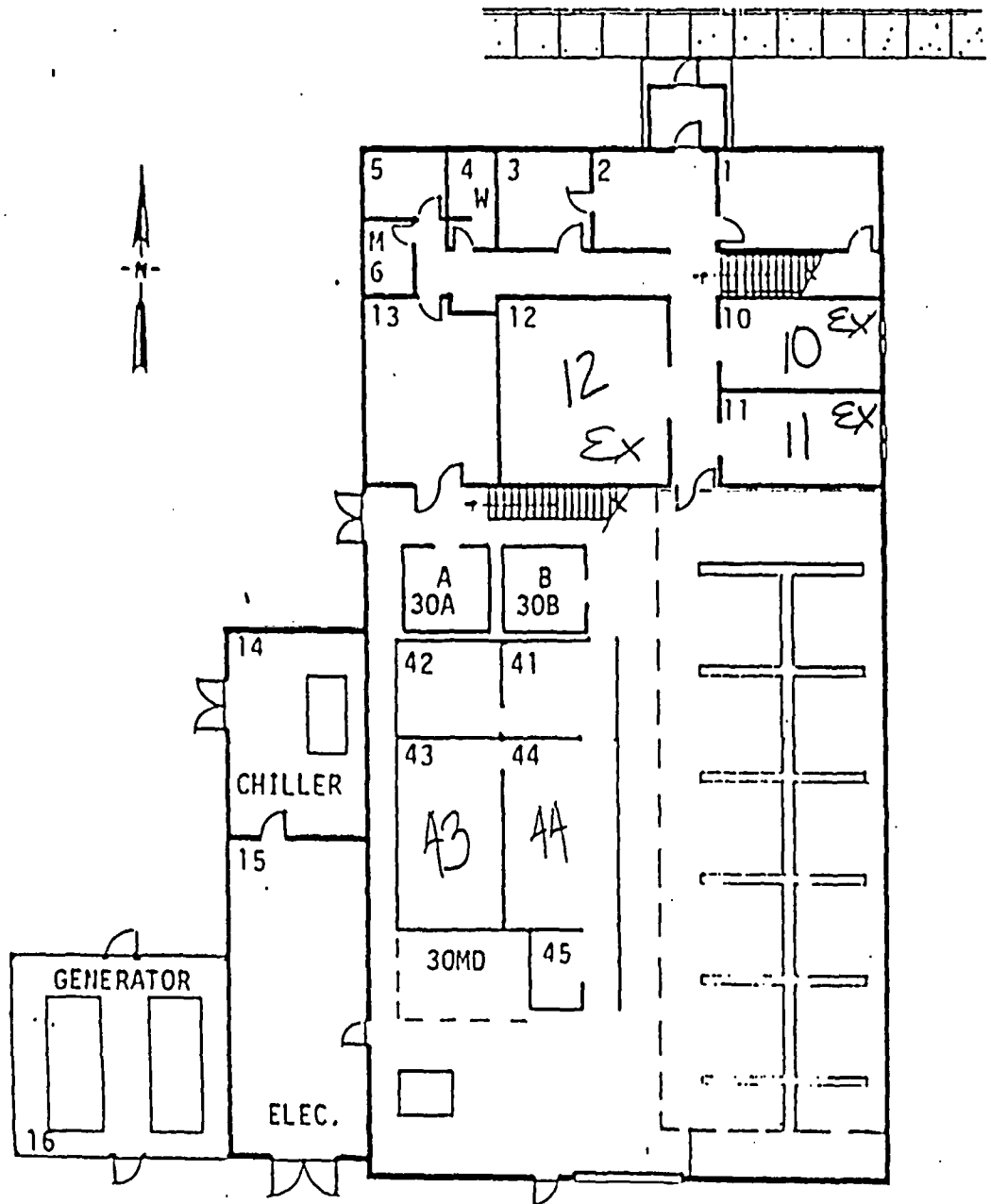
PEB/WLD/WRF



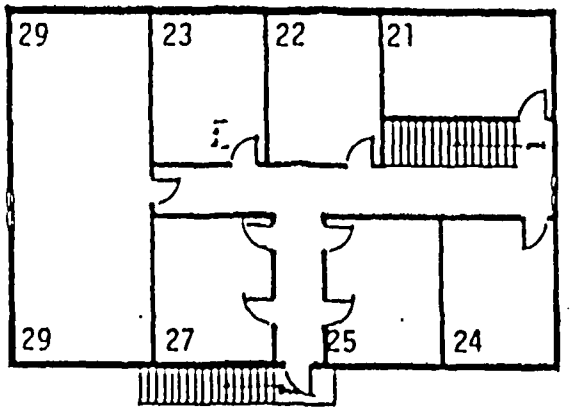
TERRESTRIAL ECOLOGY RESEARCH FACILITY

TERF

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
CORVALLIS ENVIRONMENTAL RESEARCH LABORATORY



FIRST FLOOR
WFTS MAIN BUILDING



SECOND FLOOR
WFTS MAIN BUILDING

WES

10, 11, 12, 43, 44