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Managed by Brookhaven Science Associates
For the U.S. Department of Energy
www.bnl.gov

Memo

Date: *5/18/11*

To: *D. Beavis*

From: *P. Bergh* P. Bergh 5/18/11

Subject: **Radiological surveys conducted at the Electron Beam Ion Source(EBIS).**

EBIS is currently located in a posted "RADIOACTIVE MATERIAL AREA, CONTROLLED AREA, TLD required for Entry". All surveys performed to date at EBIS indicate the radiological condition is well within the parameters of this posting.

A survey performed on 6/24/10 (see attachment 1), during initial operation of the RF cavity at 157 kW yielded dose rates of 14 mrem/h at one foot. Note, these surveys were performed with the HPI 1010 which has a quality factor of 5, given only X-rays were being measured the actual dose rate is consider to be < 3 mrem/h at one foot.

On 2/16/11 a survey (see attachment 2) was performed on the EBIS beam line with gold running. The highest one foot dose rate recorded was 1 mrem/h.

Area Monitoring TLDs were placed along the EBIS beam line (see attachment 3 for TLD locations) for the first quarter of CY 2011. An area TLD result of 25 mrem (Photon) for the three month period was indicated near the RF cavity. No neutron dose was recorded. The photon dose recorded is well within the area radiological posting (See attachment 4 for area TLD results).

A survey (See attachment 5) was performed on 5/18/11 while EBIS was shut down. This survey indicated no activated components along the beam line.

ATTACHMENT 1

BNL RADIOLOGICAL SURVEY FORM

Bldg. #: 930 o **Routine**
Location: LINAC-EBIS X **Special** Request
Date/Time: 6-24-10 1330 o **RWP#**

Smear Survey Results (DPM/100cm²)

	^3H	$\beta-\gamma$	α				
1.				16.			
2.				17.			
3.				18.			
4.				19.			
5.				20.			
6.				21.			
7.				22.			
8.				23.			
9.				24.			
10.				25.			
11.				26.			
12.				27.			
13.				28.			
14.				29.			
15.				30.			

Masslinn Survey Results (DPM/LAS)

1.		8.	
2.		9.	
3.		10.	
4.		11.	
5.		12.	
6.		13.	
7.		14.	

Exposure Rates (Highest)		Airborne Contamination		
Contact	44 mRem/hr	Time	µCi/cc	%DAC
General Area	14 mRem/hr			

Legend: λ Smear Location v Masslinn Location ▲ Airborne

xxx v
zzz

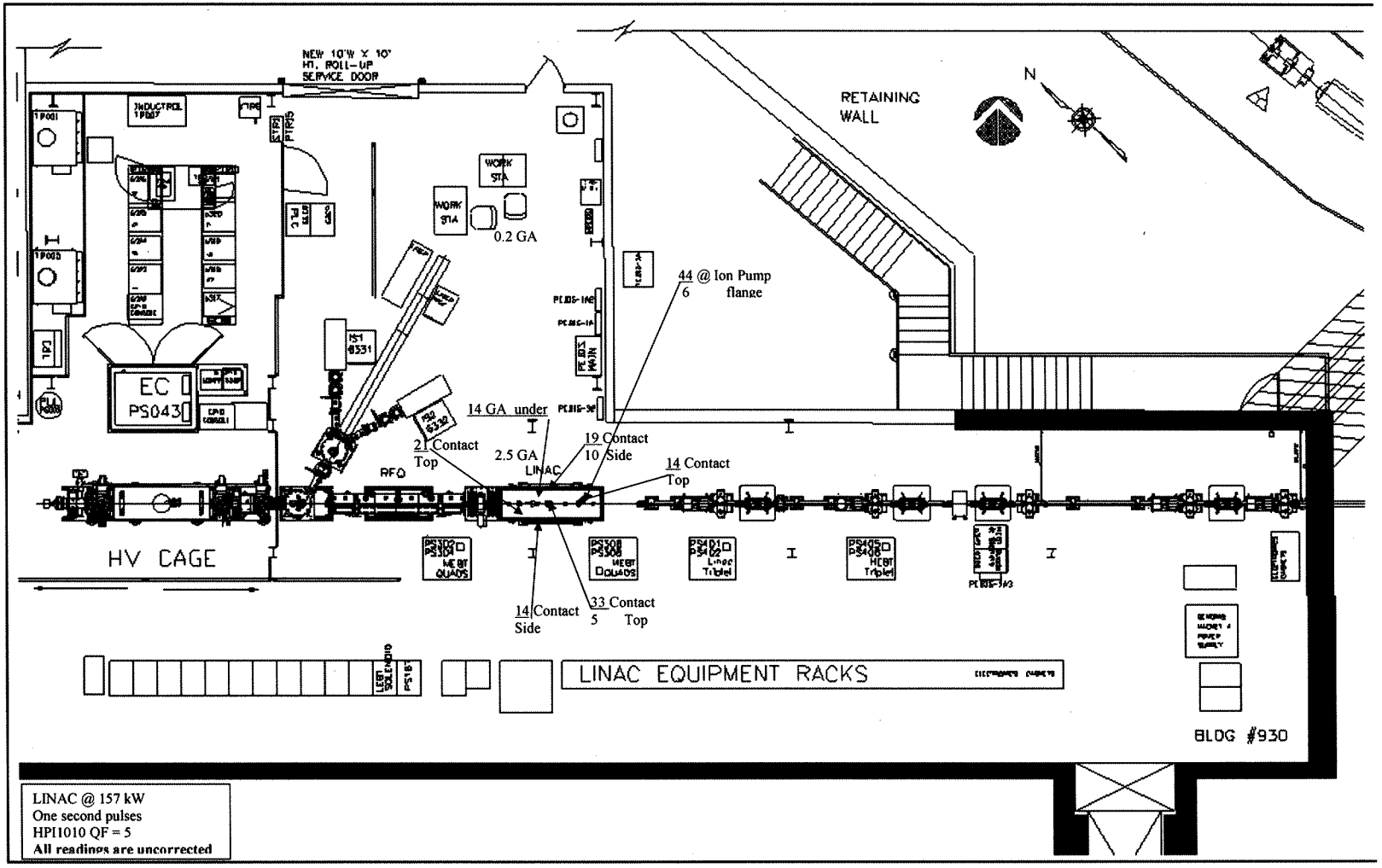
xxx=Contact Reading
zzz=Reading@ 30cm
y= Radiation Type

o All Exposure Rates are in mRem/hr and taken at 12 inches (30 cm) unless otherwise noted.

Model	HPI1010		
Serial #	418		
Cal Due Date	2-25-11		
Source Checked (yes or no)	Yes		

Form FS-1000.1

File Code: FS72SR.09



Surveyed By: Kenneth Boland 6-24-10
Signature/Date

Reviewed By: Reviewed survey on file in HP office
Signature/Date

ATTACHMENT 2

BNL RADIOLOGICAL SURVEY FORM

Bldg. #: 930 o **Routine** _____
Location: LINAC-EBIS X **Special** Request
Date/Time: 2-16-11 1230 o **RWP#** _____

Smear Survey Results (DPM/100cm²)

	^3H	$\beta-\gamma$	α				
1.				16.			
2.				17.			
3.				18.			
4.				19.			
5.				20.			
6.				21.			
7.				22.			
8.				23.			
9.				24.			
10.				25.			
11.				26.			
12.				27.			
13.				28.			
14.				29.			
15.				30.			

Masslinn Survey Results (DPM/LAS)

1.		8.	
2.		9.	
3.		10.	
4.		11.	
5.		12.	
6.		13.	
7.		14.	

Exposure Rates (Highest)		Airborne Contamination		
Contact	3.7 mRem/hr	Time	µCi/cc	%DAC
General Area	1 mRem/hr			

Legend: λ Smear Location v Masslinn Location ▲ Airborne

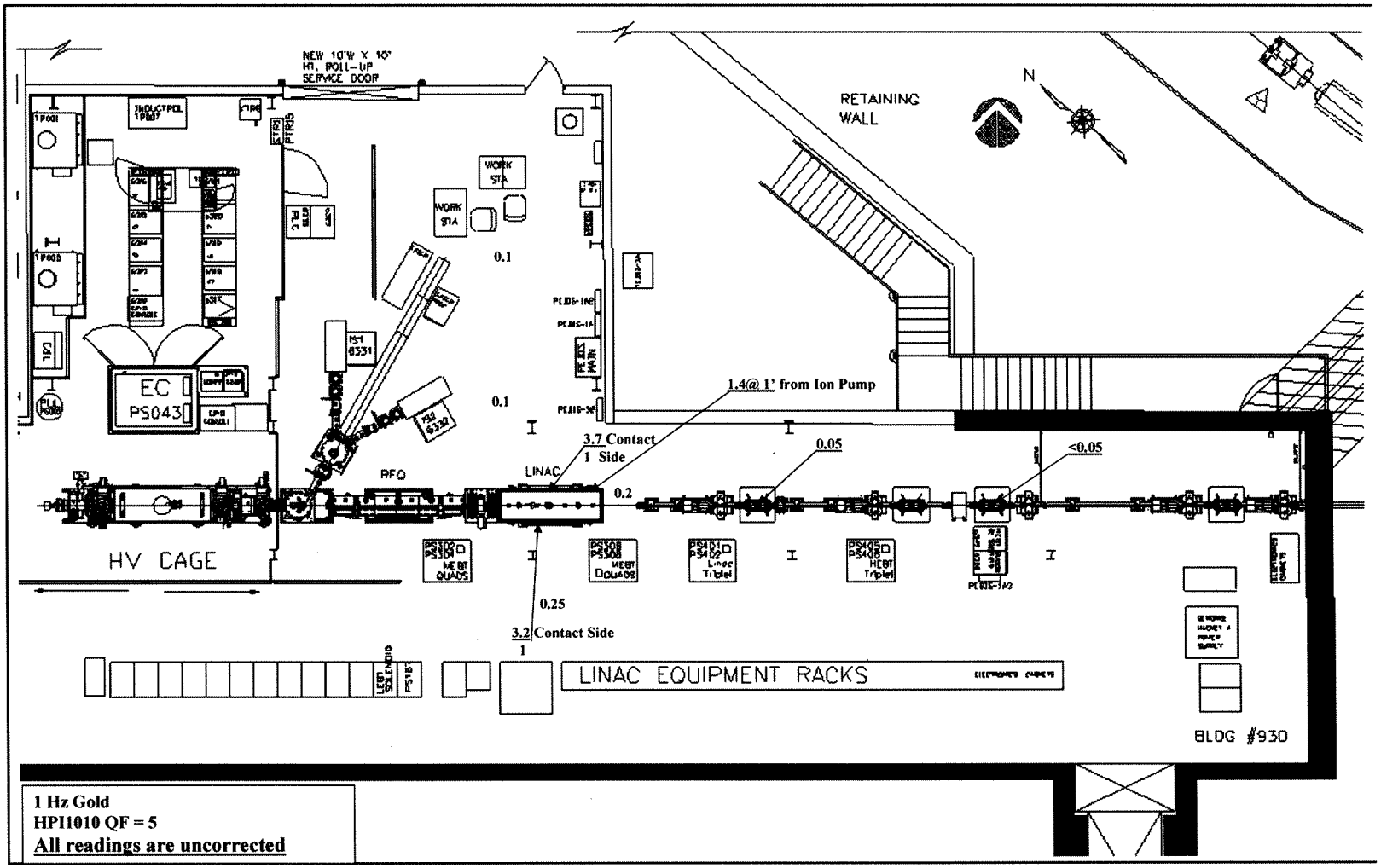
xxx v
zzz

xxx=Contact Reading
zzz=Reading@ 30cm
y= Radiation Type

o All Exposure Rates are in mRem/hr and taken at 12 inches (30 cm) unless otherwise noted.

Model	HPI1010		
Serial #	418		
Cal Due Date	2-24-11		
Source Checked (yes or no)	Yes		

Form FS-1000.1



1 Hz Gold
HPI1010 QF = 5
All readings are uncorrected

Surveyed By: Kenneth Boland 2-16-11
Signature/Date

Reviewed By: Reviewed survey on file in HP office
Signature/Date

File Code: FS72SR.09

ATTACHMENT 3

BNL RADIOLOGICAL SURVEY FORM

Bldg. #: 930 o **Routine** ____
Location: LINAC-EBIS o **Special** TLDs
Date/Time: 1-19-11 o **RWP#** ____

Smear Survey Results (DPM/100cm²)

	^3H	$\beta-\gamma$	α				
1.				16.			
2.				17.			
3.				18.			
4.				19.			
5.				20.			
6.				21.			
7.				22.			
8.				23.			
9.				24.			
10.				25.			
11.				26.			
12.				27.			
13.				28.			
14.				29.			
15.				30.			

Masslinn Survey Results (DPM/LAS)

1.			8.		
2.			9.		
3.			10.		
4.			11.		
5.			12.		
6.			13.		
7.			14.		

Exposure Rates (Highest)		Airborne Contamination		
Contact		Time	µCi/cc	%DAC
General Area				

Legend: λ **Smear Location** v **Masslinn Location**
▲ **Airborne**

xxx y
zzz

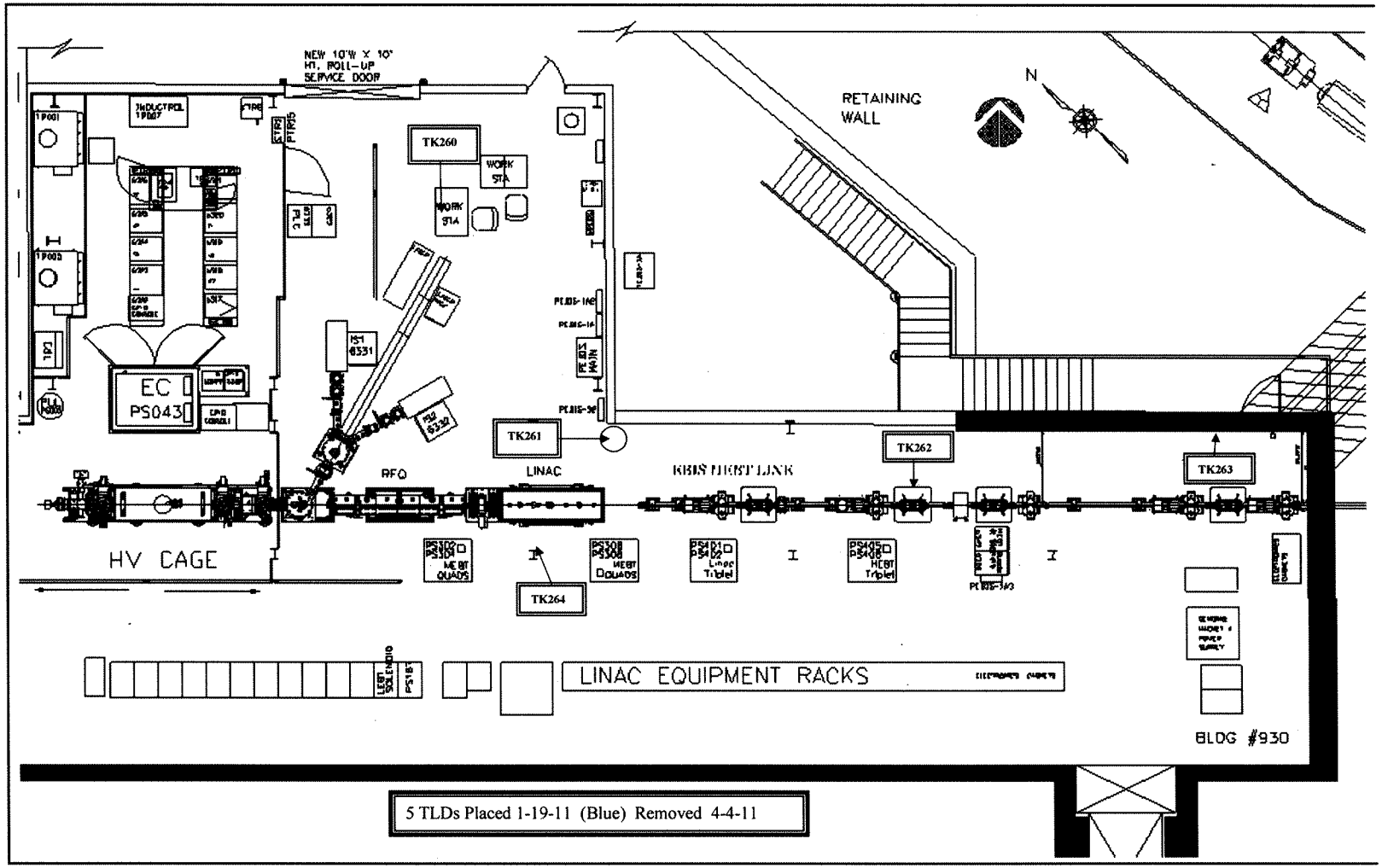
xxx=Contact Reading
zzz=Reading@ 30cm
y= Radiation Type

o All Exposure Rates are in mR/hr and taken at 12 inches (30 cm) unless otherwise noted.

Model			
Serial #			
Cal Due Date			
Source Checked (yes or no)			

Form FS-1000.1

File Code: FS72SR.09



Surveyed By: Kenneth Boland
Signature/Date

Reviewed By: ____
Signature/Date

ATTACHMENT 4

Test Number: _____

TEST DOSIMETRY WORKSHEET

Requestor(s): Paul Bergh / Ken Boland Phone No: 5992 / 4660 Beeper No: _____

Account # 18014 Badge Type: 8814/A Prepared By: Gerry Townsend Date Issued: 1/6/2011

BADGE ID NO.	PROCESS ID NO.	DATE RETURNED	DOSE RESULTS (rem) SHALLOW	LENS	NEUTRON from TLD	DEEP	DOSE NEUTRON from CR39 (mrem)	CR39 ID#
Tk260*	#1104329	4/6/2011	0.029	0.017	0	0.014	0	1768109N
TK261*	"	"	0.046	0.023	0	0.020	0	1768110N
Tk262*	"	"	0.033	0.021	0	0.014	0	1768111N
TK263*	"	"	0.021	0.022	0	0.012	0	1768112N
Tk264*	"	"	0.053	0.045	0	0.036	0	1768113N
PM-Bkg	#1104352	4/12/2011	0.014	0.013	0	0.011		See REMARK #2

DESCRIPTION OF TEST: **"EBIS" TLD Area Monitors - 1st Qtr 2011**

REMARKS:

1) Annealed for rep'or Report Period - 2011111

2) The reported dose values in this report are the total dose as measured by the dosimeter. There has not been any "background" adjustment applied. For reference purposes, the average results of a set of badges used to monitor the background in the PM work area in Bldg. #490 have been included above on the line labeled "PM-Bkg".

* = Type-A badge

REPORT PREPARED BY:	DATE:	REPORT REVIEWED BY:	DATE:
R. Thompson	5/17/2011	R. Thompson	5/17/2011

PM6620.07

ATTACHMENT 5

BNL RADIOLOGICAL SURVEY FORM

Bldg. #: 930 o **Routine**
Location: LINAC-EBIS X **Special** Request
Date/Time: 5-18-11 1000 o **RWP#**

Smear Survey Results (DPM/100cm²)

	^3H	$\beta-\gamma$	α				
1				16			
2				17			
3				18			
4				19			
5				20			
6				21			
7				22			
8				23			
9				24			
10				25			
11				26			
12				27			
13				28			
14				29			
15				30			

Masslinn Survey Results (DPM/LAS)

1			8		
2			9		
3			10		
4			11		
5			12		
6			13		
7			14		

Exposure Rates (Highest)		Airborne Contamination		
Contact	N/A	Time	µCi/cc	%DAC
General Area	5 uRem/Hr			

Legend: λ **Smear Location** v **Masslinn Location**
▲ **Airborne**

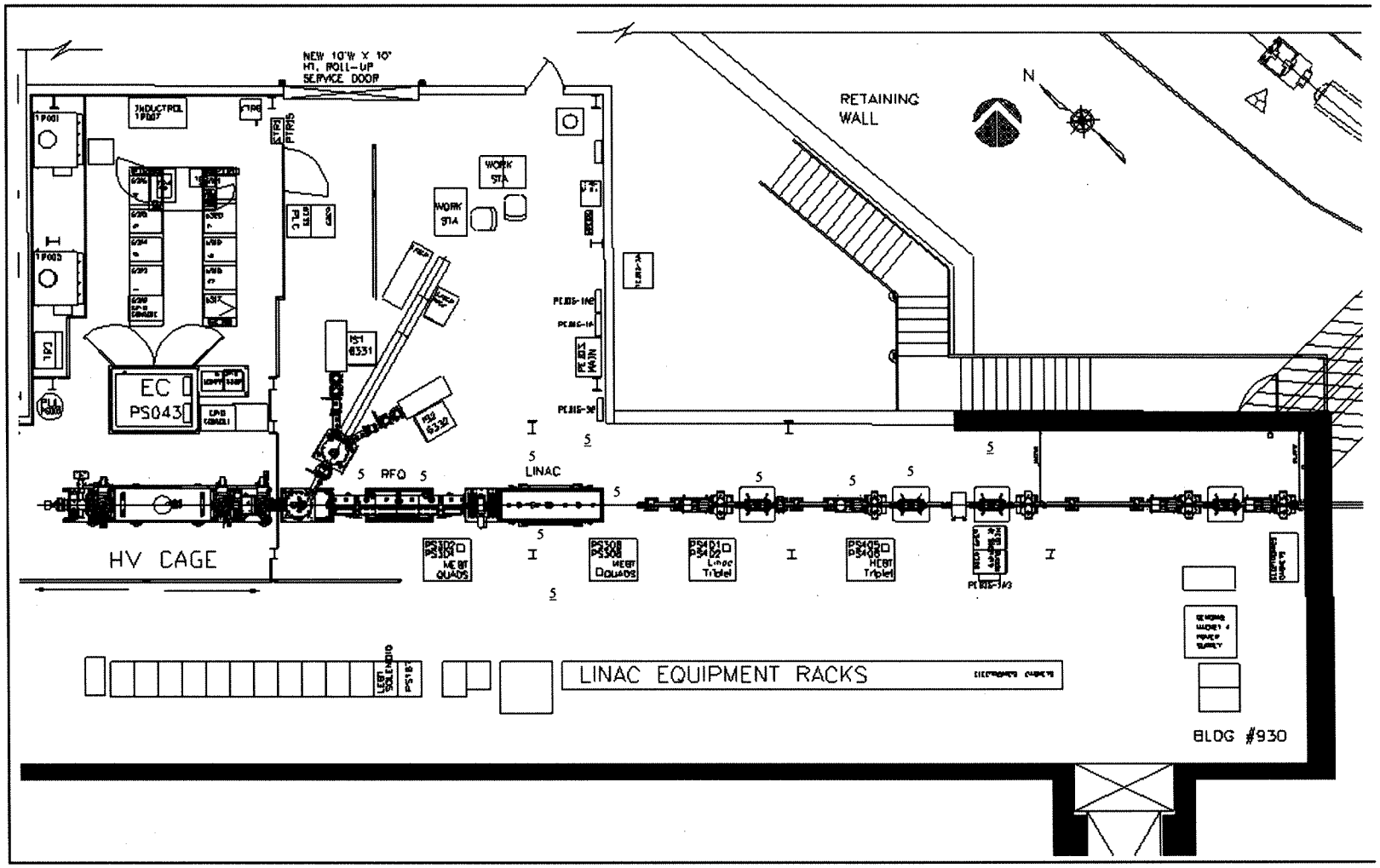
xxx v
zzz

xxx=Contact Reading
zzz=Reading@ 30cm
y= Radiation Type

o All Exposure Rates are in uRem/hr and taken at 12 inches (30 cm) unless otherwise noted.

Model	LD-19		
Serial #	73511		
Cal Due Date	5-2-12		
Source Checked (yes or no)	Yes		

Form FS-1000.1



LINAC off
Activation survey of EBIS
Background = 5ur/hr

Surveyed By: J. Williams 5-18-11

Reviewed By: Reviewed survey on file in HP office