

2750 Fox Creek Drive  
Germantown, TN 38138

July 11, 1994

Mr. Jack Grobe  
Radiation Specialist  
Region III, NRC  
Fax No. (708)525-1259

RE: NRC # 24-16652-02  
Lucy Lee Hospital  
Poplar Bluff, MO 39216

Dear Mr. Grobe :

As per my telephone discussion with Ms. Evelyn Matson Friday's morning, I would implement, as of this month, (1) a monthly electrical safety interlock check of the head swivel mechanism on the cobalt teletherapy unit at the above facility. I had the opportunity to visit the hospital last weekend, and performed the test. Attached is the revised monthly calibration report in which the above interlock check is included hereon.

Also discussed with Ms Matson were (2) linearity and constancy check of the exposure timer, and (3) the beam uniformity check on all commonly used beam orientation. These items had been tested, analyzed and evaluated, and the results were found satisfactory. Attached are the reports illustrating the measured data that was taken last weekend. These tests, Items (2) & (3), will be included hereon in my annual calibration as per 10 CFR 35.632.b(3).

The cobalt unit is now considered functioning properly.

If you or Ms. Matson require any additional information, please let me know. I can be reached at (901)227-5009 or (901)227-5007. Thank you very much for your attention.

Sincerely,



Douglas L. Tai, Ph.D.

Consultant Physicist

cc: Bill Lewis, Hospital Physicist  
Gene Smith, Group Manager

Fax to (708)515-1259

**Mr. Jack Grobe**

*NRC, Region III*

*801 Warrenville Road*

*Lisle, Illinois 60532*

*From*

**Douglas L. Tai, Ph.D.**

*Consultant Physicist*

*Lucy Lee Hospital*

*Telephone (901)227-5009*

*July 12, 1994*

*Excluding cover sheet, there are 9 pages of document altogether*

Lucy Lee Hospital

$$Cc(NEL) = 47.02$$

Charge Corr. Factor = 1.007

$$Cc(\mathcal{N}A) = 54.60$$
[illegible]
$$\text{Total Correction} = C_c \times \text{DMM} \times C(\text{TP}) \times C(\text{lambda}) \times (80/80.5)^2 / (1 + \alpha)$$

1994

# Monthly Checklist for A T C Cobalt-60 Unit

Lucy Lee Hospital

1994	January 8	January 29	February 19	March 12	April 9	May 7	June 11	July 8	August	September	October	November	December
Source Condition	✓	✓	✓	✓	✓	✓	✓	✓					
Indicator Check	✓	✓	✓	✓	✓	✓	✓	✓					
Visible Warning Device (Door Light)	✓	✓	✓	✓	✓	✓	✓	✓					
Visible Warning Device (Area Monitor Device)	✓	✓	✓	✓	✓	✓	✓	✓					
Intercom	✓	✓	✓	✓	✓	✓	✓	✓					
Door Interlock	✓	✓	✓	✓	✓	✓	✓	✓					
Emergency Off System	✓	✓	✓	✓	✓	✓	✓	✓					
Timer Off Switch	✓	✓	✓	✓	✓	✓	✓	✓					
Electrical Safety Interlock of Head Stand *								✓					
Accuracy of Laser Light System	✓	✓	✓	✓	✓	Require Adjustment	✓	✓					
Accuracy of Optical Distance Indicator	✓	✓	✓	✓	✓	✓	✓	✓					
Congruence of Light or Radiation Field	✓	✓	✓	✓	✓	✓	✓	✓					
Accuracy of Door Gate	✓	✓	✓	✓	✓	✓	✓	✓					
Performed by													

\* Involving all 4 swiveling motions: In and Out; Left and Right)

Cobalt-1994

# *Timer Linearity Check*

*Lucy Lee Hospital*

*Measured and Analyzed by Douglas L. Tai, Ph.D.*

7/8/1994

<i>Time min</i>	<i>Charge 10 nC</i>	<i>Average Charge</i>	<i>Expected Time</i>	<i>Timer Error min</i>	<i>Timer Error <math>\alpha</math></i>
1.0	2.009	2.008	0.99797	0.00203	0.00203
	2.007				
1.5	3.022	3.023	1.50557	-0.00557	-0.00371
	3.023				
2.0	4.004	4.003	1.99591	0.00409	0.00205
	4.001				
2.5	5.014	5.016	2.50276	-0.00276	-0.00110
	5.017				
3.0	6.000	5.999	2.99485	0.00515	0.00172
	5.998				
3.5	7.015	7.015	3.50295	-0.00295	-0.00084
	7.014				
<i>y</i>		<i>x</i>			<i>Acceptable</i>

$$m = 0.500347$$

$$b = -0.006730$$

$$r = 0.999989$$

## *Acceptable Timer Constancy*

*Six 1 minute Exposure in 10  $x$  nanocoulomb*

1.979	1.976	1.978	1.976	1.979	1.979
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$$\text{Average} = 1.9778$$

$$\text{Standard Deviation} = 0.0015$$

# Off-Axis Ratio for ATC Cobalt Teletherapy Unit

Lucy Lee Hospital

Max Field Size = 34 cm x 34 cm

(7/8/1994)

No Trimmers

Distance from Center cm	Gantry 90° nC (1 min Exp)	Gantry 270° nC (1/2 min Exp)	Gantry 180° nC (1/2 min Exp)	Gantry 0° nC (1/2 min Exp)	Distance from Center cm
18	1.45	3.30	3.75	1.30	18
17	6.10	8.55	8.70	5.80	17
16.5	11.05	9.35	9.30	8.20	16.5
16	15.95	9.65	9.65	6.10	16
15	19.05	10.05	9.85	9.70	15
14	19.30	10.10	10.05	9.95	14
12	19.80	10.30	10.30	10.20	12
10	20.20	10.55	10.45	10.40	10
8	20.50	10.70	10.60	10.70	8
6	20.70	10.75	10.70	10.75	6
4	20.90	10.85	10.75	10.75	4
2	20.90	10.90	10.85	10.80	2
0	20.95	10.95	10.80	10.80	0
-2	20.95	10.95	10.85	10.80	-2
4	20.90	10.95	10.80	10.70	4
-6	20.75	10.90	10.70	10.70	-6
-8	20.50	10.80	10.60	10.55	-8
-10	20.20	10.60	10.40	10.45	-10
-12	19.95	10.45	10.20	10.25	-12
-14	19.35	10.20	10.00	9.95	-14
-15	19.10	10.00	9.90	9.90	-15
-16	17.45	9.65	9.75	9.10	-16
-16.5	13.00	9.15	9.40	8.25	-16.5
-17	7.95	7.35	8.50	5.80	-17
-18	1.65	1.80	3.55	1.15	-18

# Off-Axis Ratio for ATC Cobalt Teletherapy Unit

Lucy Lee Hospital

Max Field Size = 34 cm x 34 cm

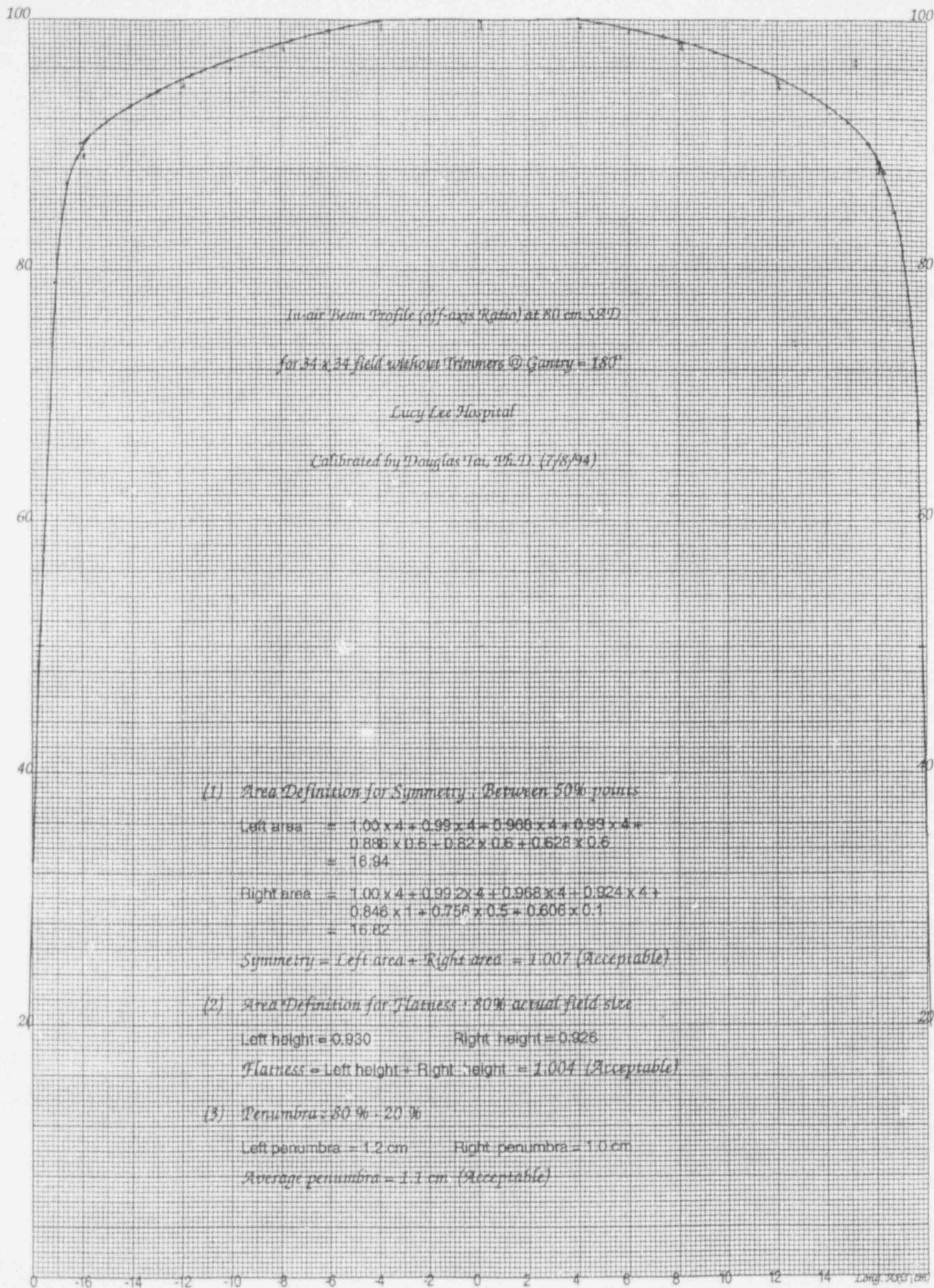
(7/8/1994)

No Trimmers

Distance from Center cm	Gantry 90° nC (1 min Exp)	Gantry 270° nC (1/2 min Exp)	Gantry 180° nC (1/2 min Exp)	Gantry 0° nC (1/2 min Exp)	Distance from Center cm
18	0.07	0.30	0.35	0.12	18
17	0.29	0.78	0.81	0.54	17
16.5	0.53	0.85	0.86	0.76	16.5
16	0.76	0.88	0.89	0.56	16
15	0.91	0.92	0.91	0.90	15
14	0.92	0.92	0.93	0.92	14
12	0.95	0.94	0.95	0.94	12
10	0.96	0.96	0.97	0.96	10
8	0.98	0.98	0.98	0.99	8
6	0.99	0.98	0.99	1.00	6
4	1.00	0.99	1.00	1.00	4
2	1.00	1.00	1.00	1.00	2
0	1.00	1.00	1.00	1.00	0
-2	1.00	1.00	1.00	1.00	-2
4	1.00	1.00	1.00	0.99	4
-6	0.99	1.00	0.99	0.99	-6
-8	0.98	0.99	0.98	0.98	-8
-10	0.96	0.97	0.96	0.97	-10
-12	0.95	0.95	0.94	0.95	-12
-14	0.92	0.93	0.93	0.92	-14
-15	0.91	0.91	0.92	0.92	-15
-16	0.83	0.88	0.90	0.84	-16
-16.5	0.62	0.84	0.87	0.76	-16.5
-17	0.38	0.67	0.79	0.54	-17
-18	0.08	0.16	0.33	0.11	-18



461510

K.E. 10 X 10 TO THE CENTIMETER 18 X 25 CM  
KEUFFEL & ESSER CO. MADE IN U.S.A.



# Off-Axis Ratio for ATC Cobalt Teletherapy Unit

Max Field Size = 34 cm x 34 cm

With Trimmers

Distance from Center cm	Gantry 180° nC (1/2 min Exp)	Gantry 180° Normalized	Distance from Center cm
18	0.85	0.08	18
17.5	2.05	0.19	17.5
17	6.10	0.55	17
16.5	9.25	0.84	16.5
16	9.65	0.87	16
15	9.95	0.90	15
14	10.10	0.91	14
12	10.35	0.94	12
10	10.60	0.96	10
8	10.85	0.98	8
6	10.80	0.98	6
4	10.85	0.98	4
2	10.85	0.98	2
0	11.05	1.00	0
-2	10.90	0.99	-2
-4	10.95	0.99	-4
-6	10.80	0.98	-6
-8	10.70	0.97	-8
-10	10.50	0.95	-10
-12	10.35	0.94	-12
-14	10.10	0.91	-14
-15	9.95	0.90	-15
-16	9.75	0.88	-16
-16.5	9.50	0.86	-16.5
-17	7.90	0.71	-17
-17.5	3.40	0.31	-17.5
-18	1.10	0.10	-18

46 1510

K<sub>0</sub>E 10 X 10 TO THE CENTIMETER 10 X 25 CM  
KEUFFEL & ESSER CO. MADE IN U.S.A.