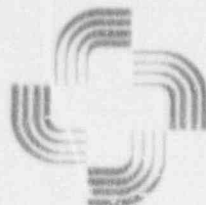


Radiation Oncologists
Roger P. Takara, M.D. Medical Director
Frank D. Farnitz, M.D.
Philip A. Schell, M.D.
Radiation Physicists
Wilfred J. Kelly, Ph.D.
Alan Hashemi, M.S.



MEMORIAL REGIONAL
CANCER CENTER
RADIATION ONCOLOGY
M. Schell

Accredited by
American College of Radiology
American College of Surgeons

DCD/DCB

November 5, 1990

William Schultz, Chief Nuclear Materials Safety
U.S. Nuclear Regulatory Commission
Region III
799 Roosevelt Rd.
Glen Ellyn, Illinois 60137

Docket No. 030-19173
License No. 13-18881-02

Re: Reply to a notice of violation

Gentlemen:

This reply includes the answer to the following questions for the alleged violation:

1. The reason for our claim that there was no violation.
2. The evidence that we were following proper procedures.
3. The steps that will be taken to assure future compliance.
4. The date when these additional steps will be achieved.

Alleged Violation: "Periodic spot-checks have not been performed with a calibrated dosimetry system or a system that was compared with a calibrated dosimetry system as defined by 10 CFR 35.630."

1. Reason for our claim that there was no violation

Our current method of spot checks on the Cobalt 60 unit is to have our technologists perform exposures of the beam using the Protea RBA-3 Analyzer. The readings taken are then checked by the physicist who then performs the necessary calculations for output and timer error. This RBA-3 unit is intercompared yearly with the Keithley 616 system and after servicing.

In contacting our physicist and former radiation safety officer, Alex Hashemi, M.S., who left our hospital August 1, 1990, we were informed that during the routine inspection in 1989, he explained our procedure for spot checks of the Cobalt 60 unit and the inspector stated we were in compliance. Moreover, Dennis Justice, Ph.D., who was RSO here until spring of 1989, stated that it was he who instituted use of the Protea for

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REG3 LIC30
13-18881-02 PDR

615 North Michigan Street
South Bend, Indiana 46601-9985
219/284-7461

NOV 8 1990

spot checks and intercomparison with the Keithley 616 system. Up until the September 20, 1990, no inspectors had found fault with this method of spot checks.

2. Evidence that current practice is in Compliance with 10 CFR 35.630

- a. Exhibit C shows copies of all weekly Protea RBA-3 readings and checks that had been done since October 20 of 1989.
- b. Exhibits A and B show the intercomparison being done from both our Co-60 Calibration log book and Chamber Calibration log book in November of 1989, which would have been within the 1 year requirement.

3. Steps to be taken to assure future compliance

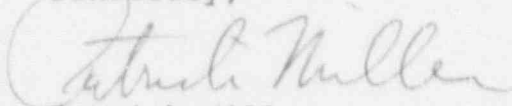
Because we believe we are currently in compliance we do not feel we need to take additional steps at this time. However, to assure that intercomparison data is clearly available with the spot check log book, we will in the future include a copy of the intercomparison page of our "Chamber Calibration" book in the Cobalt 60 spot check log.

4. Date when added steps will be implemented.

The intercomparison data will be included in the Cobalt 60 log book immediately as of this date November 5, 1990.

If this response is inadequate we would be glad to take further action but we do feel that at this time we are essentially in compliance.

Sincerely,



Patrick Miller
Director, Radiation Oncology
Memorial Hospital of South Bend

November 5, 1990

11/18/89

Output Calibration :

0.6 cc Farmer chamber, 616 Keithley electrometer, in Air measurement 10x10 field size, SAD 80, 0.5cm build up cap used, electrometer leakage zero for 3 mins., Gantry at 0°

T = 20 P = 750 TPC = 1.006

time	Coul.
1 min.	3.410, 3.410, 3.410, <3.432
3 min.	10.350, 10.340, <10.395

timer error (α):

$$\frac{M_1}{t_1 + \alpha} = \frac{M_2}{t_2 + \alpha} \quad \alpha = \frac{M_2 t_1 - M_1 t_2}{M_1 - M_2}$$

$$M_1 = 10.345$$

$$M_2 = 3(3.410) = 10.23$$

$$t_1 = 3 \text{ mins.}$$

$$t_2 = 3 \times 1 = 3 \text{ mins.}$$

$$n = 3$$

$$\alpha = \frac{(10.23)3 - (10.345)3}{3(10.345) - 10.230} = -.01658$$

$$\dot{X} = \left(\frac{Q}{1 - .01658} \right) (N_c) \left(\frac{\text{electrom.}}{\text{Factor}} \right)$$

$$= \left(\frac{3.432}{.9834} \right) (48.54) (1.005) = 170.25 \frac{\text{Rcm}^2/\text{hr}}{\text{min}}$$

$$\dot{D} = (170.25) (0.95) = 161.74 \frac{\text{rad}}{\text{min}}$$

$$\dot{Y} = 103.96 \frac{\text{Rcm}^2/\text{hr}}{\text{min}}$$

Exhibit A

From Cohort 60 Log book

Gantry at 90° :

time	Coul.
1 min.	3.410, 3.410, <3.440

Gantry at 90° :

time	Coul.
1 min	3.420, 3.420, <3.420

Gantry at 180° :

time	Coul.
1 min	3.410, 3.410, <3.410

all of these readings agree with the 1 min reading taken at 0° gantry position.

Gantry

Proton measurement :

20x20 F.S., SSD 80, 0.6 mins.

2
1 5 3
4

#	1	2	3	#	4	5
	.964	.966	.967		.964	1.016
	.966	.964	.969		.963	1.014
	.964	.965	.968		.964	1.017

$$\text{expected dose} = \left(\frac{\text{output}}{159.74 \text{ rad/hr.}} \right) \left(\frac{\text{C.F.}}{1.046} \right) \left(\frac{\text{B.F.}}{1.067} \right) \left(\frac{\text{time}}{0.6 \text{ min}} \right)$$

$$= 106.97 \text{ rad}$$

$$\text{Calibration factor} = \frac{\text{dose}}{\text{meas. reading}} = \frac{106.97}{1.016} = 105.29$$

11/18/89

Protea Intercomparison

Co-60 beam, Place Protea at SSD 80
open the collimators to $20 \times 20 \text{ cm}^2$ field
size, deliver 0.6 mins.

Gantry

2
1 5 3
4

#1	#2	#3	#4	#5
0.964	0.966	0.967	0.964	1.016
0.966	0.964	0.969	0.963	1.014
0.964	0.965	0.968	0.964	1.017

ave. 1.016

$$\begin{aligned}\text{expected dose} &= (\text{output}) (\text{coll. fact.}) (\text{BSF}) (\text{time}) \\ &= (154.74 \text{ rad/min}) (1.046) (1.067) (0.6) \\ &= 106.70 \text{ rad}\end{aligned}$$

$$\text{Protea Calibration Factor} = \frac{106.97}{1.016} = 105.29$$

Co-60 output was calibrated on this day using
Keithley 616 electrometer and 0.6 cc Farmer
chamber ~~by~~ by Capentec

Alex Hashemi

Exhibit B 2/5/90

Transmission Through The new Pad (Brown)

616 electrometer, 0.6 cc Farmer chamber
SSD 80, with build up cap., in air, Co-60

Time = 1 min.

Open field: 3.200, 3.200, <3.200>

Pad in field: 3.180, 3.180, <3.180>

$$\text{Transmission} = \frac{3.180}{3.200} = 0.994$$

2/6/90

checking the 616 Keithley electrometer
and 0.6 cc Farmer chamber before
sending them for calibration. Co-60 beam
times 1 min.

T = 21.5 °C P = 746 TPC = 1.017

Cond.: 3.310, 3.310, <3.310>

$$Q = 3.366$$

set up: Put chamber in Poly. phantom
with no block on top then use ODI to
~~set~~ set SSD 80

The system was sent for calibration

Exhibit C

AECL THERATRON 780 #253 -- MACHINE CHECK

Cobalt 60 Source NPI-20-6000W #T-677

6820 Ci as of 2/2/84

1. Distance Indicators

- a. Lateral lasers are concentric to +2 mm.
 b. With lasers skimming table, front pointer reads 80.0 cm.
 c. With lasers skimming table, ODF reads 80.0 cm.

2. Radiation vs. Light Field Coincidence

- a. Ready pack film at SFD 80, collimator set 20.0 x 20.0 cm.²
 b. Film and cover delivered to Physics.
 c. Scribe marks measure 20 x 20.1 cm.²
 d. Radiation and light coincidence to ±3 mm.

3. Output, Symmetry, Flatness, Timer Error

Using Protea RBA-3 Analyzer or _____:

- a. Beam analyzer in 20 x 20 field at SSD 80, zero all readouts, set timer for 1.0 minutes.
 b. Irradiate beam analyzer and record "reading set No. 1."
 c. Reset timer, zero analyzer, irradiate beam analyzer. Stop and restart beam one time approximately halfway through the irradiation. Record "reading set No. 2."

Ion Chamber No.					
Reading set No. 1	<u>984</u>	<u>975</u>	<u>983</u>	<u>975</u>	<u>985</u>
Reading set No. 2	<u>982</u>	<u>974</u>	<u>975</u>	<u>975</u>	<u>975</u>

4. Timer Linearity and Constancy

Set treatment timer to the following values and record backup timer readings:

Treatment Timer:	0.50 min.	1.00 min.	3.00 min.
Backup timer:	<u>.53 min.</u>	<u>1.03 min.</u>	<u>3.03 min.</u>

5. Support Systems (if No, record comment)

- | | | |
|--|---|-----------------------------|
| a. Door interlock functions properly | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/> |
| b. Beam status lights function properly | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/> |
| c. Viewing system functions properly | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/> |
| d. Treatment room doors function properly | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/> |
| e. Head swivel interlock prevents "beam-off shield" unless beam is directed toward floor | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/> |

COMMENT _____

A. Lent
Signature

10/20/89
Date

6. Calculations

- a. Beam analyzer calibration factor 104.50.
b. Expected output for 20 x 20 field at SSD 80 85.35.
c. Calculate output and timer error.

Output = 86.21 rad Timer error = - .01 min.

- d. Output agrees with expected value to 1.0 %.

Physicist Alex Hall

Date 10/20/89

COMMENT _____

$$\frac{.825}{.815} = \frac{1 + \Delta t}{1 + 2\Delta t}$$

$$.825 + 1.65\Delta t = .815 + .815\Delta t$$

$$.835\Delta t = -.01$$

$$\Delta t = -.01$$

AECL THERATRON 780 #253 -- MACHINE CHECK

Cobalt 60 Source NPI-20-5000W #T-677

6820 Ci as of 2/2/84

1. Distance Indicators

- a. Lateral lasers are concentric to ± 1.5 mm.
 b. With lasers skimming table, front pointer reads 80.0 cm.
 c. With lasers skimming table, ODF reads 80.0 cm.

2. Radiation vs. Light Field Coincidence

- a. Ready pack film at SSD 80, collimator set 20.0 x 20.0 cm.²
 b. Film and cover delivered to Physics.
 c. Scribe marks measure 19.9 x 19.9 cm.²
 d. Radiation and light coincidence to ± 3 mm.

3. Output, Symmetry, Flatness, Timer Error

Using Protea RBA-3 Analyzer or _____:

- a. Beam analyzer in 20 x 20 field at SSD 80, zero all readouts, set timer for 10 minutes.
 b. Irradiate beam analyzer and record "reading set No. 1."
 c. Reset timer, zero analyzer, irradiate beam analyzer. Scoop and restart beam one time approximately halfway through the irradiation. Record "reading set No. 2."

Ion Chamber No.	1	2	3	4	5
Reading set No. 1	<u>975</u>	<u>968</u>	<u>970</u>	<u>971</u>	<u>977</u>
Reading set No. 2	<u>975</u>	<u>966</u>	<u>971</u>	<u>971</u>	<u>985</u>

4. Timer Linearity and Constancy

Set treatment timer to the following values and record backup timer readings:

Treatment Timer:	0.50 min.	1.00 min.	3.00 min.
Backup timer:	<u>.53 min.</u>	<u>1.02 min.</u>	<u>3.02 min.</u>

5. Support Systems (if No, record comment)

- | | | |
|--|---|-----------------------------|
| a. Door interlock functions properly | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/> |
| b. Beam status lights function properly | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/> |
| c. Viewing system functions properly | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/> |
| d. Treatment room doors function properly | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/> |
| e. Head swivel interlock prevents "beam-on" unless beam is directed toward floor | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/> |

COMMENT _____

Mark J. Peltz 11-6-89
 Signature Date

6. Calculations

- a. Beam analyzer calibration factor 104.50.
b. Expected output for 20 x 20 field at SSD 80 84.41.
c. Calculate output and timer error.

Output = 83.29 rad Timer error = -0.01 min.

- d. Output agrees with expected value to 1.3 %.

Physicist Alex Hall, M.S.

Date 11/9/89

COMMENT _____

$$\frac{.797}{.785} = \frac{1 + \Delta t}{1 + 2\Delta t}$$

$$.797 + 1.594 \Delta t = .785 + .785 \Delta t$$

$$.012 \Delta t = -.012$$

$$\Delta t = -.01$$

AECC THERATRON 780 #253 — MACHINE CHECK

Cobalt 60 Source NPI-20-6000W #T-~~677~~ 1217

-6820 Ci as of 2/2/84

6890

11/14/89

1. Distance Indicators

- a. Lateral lasers are concentric to ± 1.0 mm.
 b. With lasers skimming table, front pointer reads 90.0 cm.
 c. With lasers skimming table, ODF reads 90.0 cm.

2. Radiation vs. Light Field Coincidence

0.08 min.

- a. Ready pack film at SSD 80, collimator set 20.0 x 20.0 cm.²
 b. Film and cover delivered to Physics.
 c. Scribe marks measure 19.9 x 19.9 cm.²
 d. Radiation and light coincidence to ± 3 mm.

3. Output, Symmetry, Flatness, Timer Error

Using Protea RBA-3 Analyzer or _____:

- a. Beam analyzer in 20 x 20 field at SSD 80, zero all readouts, set timer for 0.6 minutes.
 b. Irradiate beam analyzer and record "reading set No. 1."
 c. Reset timer, zero analyzer, irradiate beam analyzer. Stop and restart beam one time approximately halfway through the irradiation. Record "reading set No. 2."

Ion Chamber No.	1	2	3	4	5
Reading set No. 1	<u>.973</u>	<u>.961</u>	<u>.965</u>	<u>.972</u>	<u>1.033</u>
Reading set No. 2	<u>.971</u>	<u>.962</u>	<u>.963</u>	<u>.973</u>	<u>1.005</u>

4. Timer Linearity and Constancy

Set treatment timer to the following values and record backup timer readings:

Treatment Timer:	0.50 min.	1.00 min.	3.00 min.
Backup timer:	<u>.53 min.</u>	<u>1.02 min.</u>	<u>3.02 min.</u>

5. Support Systems (if No, record comment)

- a. Door interlock functions properly Yes ☒ No ☐
 b. Beam status lights function properly Yes ☒ No ☐
 c. Viewing system functions properly Yes ☒ No ☐
 d. Treatment room doors function properly Yes ☒ No ☐
 e. Head swivel interlock prevents "beam-on" unless beam is directed toward floor Yes ☒ No ☐

off shield

COMMENT _____

Mal A. Celli
 Signature

11-28-89
 Date

6. Calculations

- a. Beam analyzer calibration factor 105.29 106.70
 b. Expected output for 20 x 20 field at SSD 80 103.24
 c. Calculate output and timer error.

Output = 108.76 rad Timer error = -0.026 min.

- d. Output agrees with expected value to 1.9 %.

Physicist Alex H. [Signature]

Date 11/28/84

COMMENT _____

$$\frac{1.033}{1.005} = \frac{1 + \Delta t}{1 + 2 \Delta t}$$

$$1.033 + 2.066 \Delta t = 1.005 + 1.005 \Delta t$$

$$1.061 \Delta t = -0.028$$

$$\Delta t = -0.026$$

AECL THERATRON 780 #253 — MACHINE CHECK

Cobalt 60 Source NPI-20-6000W #T-~~687~~ 1017

4820 Ci as of 2/2/84

6890

11/14/89

1. Distance Indicators

- a. Lateral lasers are concentric to ± 1.0 mm.
 b. With lasers skimming table, front pointer reads 80.0 cm.
 c. With lasers skimming table, ODF reads 20.0 cm.

2. Radiation vs. Light Field Coincidence

0.08 min.

- a. Ready pack film at SFD 80, collimator set 20.0 x 20.0 cm.²
 b. Film and cover delivered to Physics.
 c. Scribe marks measure 20 x 19.9 cm.²
 d. Radiation and light coincidence to ± 3 mm.

3. Output, Symmetry, Flatness, Timer Error

Using Protea RBA-3 Analyzer or _____:

- a. Beam analyzer in 20 x 20 field at SSD 80, zero all readouts, set timer for 0.6 minutes.
 b. Irradiate beam analyzer and record "reading set No. 1."
 c. Reset timer, zero analyzer, irradiate beam analyzer. Stop and restart beam one time approximately halfway through the irradiation. Record "reading set No. 2."

Ion Chamber No.	1	2	3	4	5
Reading set No. 1	<u>.971</u>	<u>.961</u>	<u>.967</u>	<u>.965</u>	<u>1.004</u>
Reading set No. 2	<u>.971</u>	<u>.960</u>	<u>.967</u>	<u>.966</u>	<u>.988</u>

4. Timer Linearity and Constancy

Set treatment timer to the following values and record backup timer readings:

Treatment Timer:	0.50 min.	1.00 min.	3.00 min.
Backup timer:	<u>.53 min.</u>	<u>1.02 min.</u>	<u>3.02 min.</u>

5. Support Systems (if No, record comment)

- a. Door interlock functions properly Yes ☒ No ☐
 b. Beam status lights function properly Yes ☒ No ☐
 c. Viewing system functions properly Yes ☒ No ☐
 d. Treatment room doors function properly Yes ☒ No ☐
 e. Head swivel interlock prevents "beam-on" unless beam is directed toward floor Yes ☒ No ☐

off shield

COMMENT _____

Signature _____

Date _____

6. Calculations

- a. Beam analyzer calibration factor 105.29.
b. Expected output for 20 x 20 field at SSD 80 105.54.
c. Calculate output and timer error.

Output = 105.71 rad Timer error = -0.016 min.

- d. Output agrees with expected value to 0.2 %.

Physicist Alex Hall

Date 12/8/89

COMMENT _____

$$\frac{1.004}{.988} = \frac{1 + \Delta t}{1 + 2 \Delta t}$$

$$1.004 + 2.008 \Delta t = .988 + .988 \Delta t$$

$$1.02 \Delta t = -.016$$

$$\Delta t = -.016$$

AECL THERATRON 780 #253 — MACHINE CHECK

Cobalt 60 Source NPI-20-6000W #T-677 1017

~~6820~~ Ci as of 2/2/84

6590

11/14/89

1. Distance Indicators

- a. Lateral lasers are concentric to ± 2 mm.
 b. With lasers skimming table, front pointer reads 80 cm.
 c. With lasers skimming table, ODF reads 80 cm.

2. Radiation vs. Light Field Coincidence

0.08 min.

- a. Ready pack film at SSD 80, collimator set 20.0 x 20.0 cm.²
 b. Film and cover delivered to Physics.
 c. Scribe marks measure 19.9 x 19.9 cm.²
 d. Radiation and light coincidence to ± 3 mm.

3. Output, Symmetry, Flatness, Timer Error

Using Protea RBA-3 Analyzer or _____:

- a. Beam analyzer in 20 x 20 field at SSD 80, zero all readouts, set timer for 0.6 minutes.
 b. Irradiate beam analyzer and record "reading set No. 1."
 c. Reset timer, zero analyzer, irradiate beam analyzer. Stop and restart beam one time approximately halfway through the irradiation. Record "reading set No. 2."

Ion Chamber No.	1	2	3	4	5
Reading set No. 1	<u>975</u>	<u>962</u>	<u>966</u>	<u>972</u>	<u>1005</u>
Reading set No. 2	<u>972</u>	<u>964</u>	<u>964</u>	<u>974</u>	<u>983</u>

4. Timer Linearity and Constancy

Set treatment timer to the following values and record backup timer readings:

	0.50 min.	1.00 min.	3.00 min.
Treatment Timer:			
Backup timer:	<u>.52 min.</u>	<u>1.02 min.</u>	<u>3.03 min.</u>

5. Support Systems (if No, record comment)

- a. Door interlock functions properly Yes ☒ No ☐
 b. Beam status lights function properly Yes ☒ No ☐
 c. Viewing system functions properly Yes ☒ No ☐
 d. Treatment room doors function properly Yes ☒ No ☐
 e. Head swivel interlock prevents "beam-on" unless beam is directed toward floor Yes ☒ No ☐

off shield

COMMENT _____

Donald E. McLaughlin R.T.T. 12/24/89
 Signature Date

6. Calculations

- a. Beam analyzer calibration factor 105.29.
b. Expected output for 20 x 20 field at SSD 80 105.54.
c. Calculate output and timer error.

Output = 105.82 rad Timer error = -0.02 min.

- d. Output agrees with expected value to 0.3 %.

Physicist Alex Hadwin

Date 1/1/89

COMMENT _____

$$\frac{1.005}{.983} = \frac{1 + \Delta t}{1 + 2\Delta t}$$

$$1.005 + 2.010 \Delta t = .983 + .983 \Delta t$$

$$1.027 \Delta t = -.022$$

$$\Delta t = -.021$$

AECL THERATRON 780 #253 — MACHINE CHECK

Cobalt 60 Source NFI-20-6000W #T-577 1017

-6820 Ci as of 2/2/85

6820

11/14/89

1. Distance Indicators

- a. Lateral lasers are concentric to 4.2 mm.
 b. With lasers skimming table, front pointer reads 80 cm.
 c. With lasers skimming table, ODF reads 80 cm.

2. Radiation vs. Light Field Coincidence

0.08 min.

- a. Ready pack film at SFD 80, collimator set 20.0 x 20.0 cm.²
 b. Film and cover delivered to Physics.
 c. Scribe marks measure 20.1 x 19.8 cm.²
 d. Radiation and light coincidence to ± 3 mm.

3. Output, Symmetry, Flatness, Timer Error

Using Protea RBA-3 Analyzer or _____:

- a. Beam analyzer in 20 x 20 field at SSD 80, zero all readouts, set timer for 0.6 minutes.
 b. Irradiate beam analyzer and record "reading set No. 1."
 c. Reset timer, zero analyzer, irradiate beam analyzer. Stop and restart beam one time approximately halfway through the irradiation. Record "reading set No. 2."

Ion Chamber No.	1	2	3	4	5
Reading set No. 1	<u>976</u>	<u>962</u>	<u>961</u>	<u>975</u>	<u>997</u>
Reading set No. 2	<u>975</u>	<u>963</u>	<u>964</u>	<u>972</u>	<u>983</u>

4. Timer Linearity and Constancy

Set treatment timer to the following values and record backup timer readings:

Treatment Timer:	0.50 min.	1.00 min.	3.00 min.
Backup timer:	<u>.42 min.</u>	<u>1.03 min.</u>	<u>3.02 min.</u>

5. Support Systems (if No, record comment)

- a. Door interlock functions properly Yes ☒ No _____
 b. Beam status lights function properly Yes ☒ No _____
 c. Viewing system functions properly Yes ☒ No _____
 d. Treatment room doors function properly Yes ☒ No _____
 e. ~~Head swivel~~ interlock prevents "beam-on" unless beam is directed toward floor Yes ☒ No _____

off shield

COMMENT

 Signature Date

6. Calculations

- a. Beam analyzer calibration factor 105.29.
b. Expected output for 20 x 20 field at SSD 80 104.39.
c. Calculate output and timer error.

Output = 104.97 rad Timer error = -0.014 min.

- d. Output agrees with expected value to 0.6 %.

Physicist Anna H. Hansen, M.S.

Date 1/11/90

COMMENT _____

$$\frac{.997}{.983} = \frac{1 + \Delta t}{1 + 2 \Delta t}$$

$$.997 + 1.994 \Delta t = .983 + .983 \Delta t$$

$$1.014 \Delta t = -.014$$

$$\Delta t = -.014$$

AECL THERATRON 780 #253 -- MACHINE CHECK

Cobalt 60 Source NPI-20-6000W #T-627 1017

6820 Ci as of 2/2/84

6890

11-14-89

1. Distance Indicators

- a. Lateral lasers are concentric to +2 mm.
 b. With lasers skimming table, front pointer reads 40 cm.
 c. With lasers skimming table, ODF reads 92 cm.

2. Radiation vs. Light Field Coincidence

• 09 mins

- a. Ready pack film at SFD 80, collimator set 200 x 200 cm.²
 b. Film and cover delivered to Physics.
 c. Scribe marks measure 19.7 x 19.8 cm.²
 d. Radiation and light coincidence to ±3 mm.

3. Output, Symmetry, Flatness, Timer Error

Using Protea RBA-3 Analyzer or _____:

- a. Beam analyzer in 20 x 20 field at SSD 80, zero all readouts, set timer for 0.6 minutes.
 b. Irradiate beam analyzer and record "reading set No. 1."
 c. Reset timer, zero analyzer, irradiate beam analyzer. Stop and restart beam one time approximately halfway through the irradiation. Record "reading set No. 2."

Ion Chamber No.	1	2	3	4	5	Al
Reading set No. 1	968	967	967	970	1016	9776
Reading set No. 2	965	968	967	971	986	976

4. Timer Linearity and Constancy

Set treatment timer to the following values and record backup timer readings:

	0.50 min.	1.00 min.	3.00 min.
Treatment Timer:			
Backup timer:	<u>.53 min.</u>	<u>1.03 min.</u>	<u>2.03 min.</u>

5. Support Systems (if No, record comment)

- a. Door interlock functions properly Yes X No _____
 b. Beam status lights function properly Yes X No _____
 c. Viewing system functions properly Yes X No _____
 d. Treatment room doors function properly Yes X No _____
 e. ~~Head swivel~~ interlock prevents "beam-on" unless beam is directed toward floor Yes X No _____

off shield

COMMENT _____

Smichowski RT(RT) 1.1790
 Signature Date

6. Calculations

- a. Beam analyzer calibration factor 105.29. 104.39
 b. Expected output for 20 x 20 field at SSD 80 105.37
 c. Calculate output and timer error.

Output = 106.97 rad Timer error = 7.029 min.

(105.29 x 1.016) ⁷

$E = \frac{.9722}{.9776} = .9945 \rightarrow 105.29 + .9945 = 105.87$

- d. Output agrees with expected value to 2.5 %.
 (106.97 ÷ 105.87 = 1.01029 or 1.03%)

Physicist W. Kolarz (dosimetrist)

Date 1-22-90

COMMENT _____

$$\frac{1.016}{.986} = \frac{1 + \Delta t}{1 + 2\Delta t}$$

(1.016 x 2)

$$1.016 + 2.032\Delta t = .986 + .986\Delta t$$

$$(1.016 + .03) \quad (1.016 - .986)$$

$$1.046\Delta t = -.030$$

$$\Delta t = 7.029 (1.03 \div 1.046)$$

AECL THERATRON 780 #253 — MACHINE CHECK

Cobalt 60 Source NPI-20-6000W #T-677 1017

6820 Ci as of 2/2/84
6890 11-14-89

1. Distance Indicators

- a. Lateral lasers are concentric to 42 mm.
b. With lasers skimming table, front pointer reads 80 cm.
c. With lasers skimming table, ODF reads 30 cm.

2. Radiation vs. Light Field Coincidence

- 109 a. Ready pack film at SSD 80, collimator set 200 x 30 cm.²
b. Film and cover delivered to Physics.
c. Scribe marks measure 19.8 x 19.8 cm.²
d. Radiation and light coincidence to 23 mm.

3. Output, Symmetry, Flatness, Timer Error

Using Protea RBA-3 Analyzer or _____:

- a. Beam analyzer in 20 x 20 field at SSD 80, zero all readouts, set timer for 2.6 minutes.
b. Irradiate beam analyzer and record "reading set No. 1."
c. Reset timer, zero analyzer, irradiate beam analyzer. Stop and restart beam one time approximately halfway through the irradiation. Record "reading set No. 2."

Ion Chamber No.					
Reading set No. 1	<u>972</u>	<u>965</u>	<u>967</u>	<u>980</u>	<u>998</u>
Reading set No. 2	<u>972</u>	<u>965</u>	<u>967</u>	<u>980</u>	<u>998</u>

4. Timer Linearity and Constancy

Set treatment timer to the following values and record backup timer readings:

Treatment Timer:	0.50 min.	1.00 min.	3.00 min.
Backup timer:	<u>.52 min.</u>	<u>1.02 min.</u>	<u>3.02 min.</u>

5. Support Systems (if No, record comment)

- | | | |
|--|--------------|----------|
| a. Door interlock functions properly | Yes <u>X</u> | No _____ |
| b. Beam status lights function properly | Yes <u>X</u> | No _____ |
| c. Viewing system functions properly | Yes <u>X</u> | No _____ |
| d. Treatment room doors function properly | Yes <u>X</u> | No _____ |
| e. Head swivel interlock prevents "beam-on" unless beam is directed toward floor | Yes <u>X</u> | No _____ |

COMMENT _____

S. M. Chowdhury RTT 1-25-89
Signature Date

6. Calculations

- a. Beam analyzer calibration factor 105.29.
b. Expected output for 20.x 20 field at SSD 80 104.39.
c. Calculate output and timer error.

Output = 105.08 rad Timer error = -0.018 min.

- d. Output agrees with expected value to 0.7 %.

Physicist Alex H. Hani

Date 1/29/90

COMMENT _____

$$\frac{.998}{.980} = \frac{1 + \Delta t}{1 + 2\Delta t}$$

$$.998 + 1.996\Delta t = .980 + .980\Delta t$$

$$1.016\Delta t = -.018$$

$$\Delta t = -.018$$

AECL THERATRON 780 #253 -- MACHINE CHECK

Cobalt 60 Source NPI-20-6000W #T-677 1017

6820 Ci as of 2/2/84 11/14/89
6820

1. Distance Indicators

- a. Lateral lasers are concentric to ± 2 mm.
b. With lasers skimming table, front pointer reads 80 cm.
c. With lasers skimming table, ODF reads 80 cm.

2. Radiation vs. Light Field Coincidence

- 109 a. Ready pack film at SSD 80, collimator set 20 x 20 cm.²
b. Film and cover delivered to Physics.
c. Scribe marks measure 20.1 x 20 cm.²
d. Radiation and light coincidence to ± 3 mm.

3. Output, Symmetry, Flatness, Timer Error

Using Protea RBA-3 Analyzer or _____:

- a. Beam analyzer in 20 x 20 field at SSD 80, zero all readouts, set timer for 0.6 minutes.
b. Irradiate beam analyzer and record "reading set No. 1."
c. Reset timer, zero analyzer, irradiate beam analyzer. Stop and restart beam one time approximately halfway through the irradiation. Record "reading set No. 2."

Ion Chamber No.	1	2	3	4	5
Reading set No. 1	<u>.976</u>	<u>.961</u>	<u>.968</u>	<u>.968</u>	<u>.987</u>
Reading set No. 2	<u>.974</u>	<u>.962</u>	<u>.971</u>	<u>.962</u>	<u>.956</u>

4. Timer Linearity and Constancy

Set treatment timer to the following values and record backup timer readings:

	0.50 min.	1.00 min.	3.00 min.
Treatment Timer:	0.50 min.	1.00 min.	3.00 min.
Backup timer:	<u>.52 min.</u>	<u>1.02 min.</u>	<u>3.02 min.</u>

5. Support Systems (if No, record comment)

- | | | |
|--|--------------|----------|
| a. Door interlock functions properly | Yes <u>X</u> | No _____ |
| b. Beam status lights function properly | Yes <u>X</u> | No _____ |
| c. Viewing system functions properly | Yes <u>X</u> | No _____ |
| d. Treatment room doors function properly | Yes <u>X</u> | No _____ |
| e. Head swivel interlock prevents "beam-on" unless beam is directed toward floor | Yes <u>X</u> | No _____ |

COMMENT _____

J. M. Howarth (R220) 31-Jan-90
Signature Date

6. Calculations

- a. Beam analyzer calibration factor 105.29.
b. Expected output for 20 x 20 field at SSD 80 104.39.
c. Calculate output and timer error.

Output = 103.92 rad Timer error = -0.03 min.

- d. Output agrees with expected value to 0.4 %.

Physicist Alex Hapchen, M.D.

Date 1/31/90

COMMENT _____

$$\frac{.987}{.956} = \frac{1 + \Delta t}{1 + 2\Delta t}$$

$$.987 + 1.974 \Delta t = .956 + .956 \Delta t$$

$$1.018 \Delta t = -.031$$

$$\Delta t = -.03$$

AECL THERATRON 780 #253 -- MACHINE CHECK

Cobalt 60 Source NPI-20-6000W #T-677 1017

5820 Ci as of 2/2/84

6890

10/14/89

1. Distance Indicators

- a. Lateral lasers are concentric to ± 1.2 mm.
 b. With lasers skimming table, front pointer reads 80 cm.
 c. With lasers skimming table, ODF reads 80 cm.

2. Radiation vs. Light Field Coincidence

- a. Ready pack film at SSD 80, collimator set 20.0 x 20.0 cm.²
 b. Film and cover delivered to Physics.
 c. Scribe marks measure 19.8 x 19.7 cm.²
 d. Radiation and light coincidence to 17 mm.

3. Output, Symmetry, Flatness, Timer Error

Using Protea RBA-3 Analyzer or _____!

- a. Beam analyzer in 20 x 20 field at SSD 80, zero all readouts, set timer for 0.6 minutes.
 b. Irradiate beam analyzer and record "reading set No. 1."
 c. Reset timer, zero analyzer, irradiate beam analyzer. Stop and restart beam one time approximately halfway through the irradiation. Record "reading set No. 2."

Ion Chamber No.

Reading set No. 1

Reading set No. 2

<u>1971</u>	<u>1963</u>	<u>1963</u>	<u>1971</u>	<u>1994</u>
<u>1972</u>	<u>1963</u>	<u>1964</u>	<u>1972</u>	<u>1960</u>

4. Timer Linearity and Constancy

Set treatment timer to the following values and record backup timer readings:

Treatment Timer:	0.50 min.	1.00 min.	3.00 min.
Backup timer:	<u>0.53 min.</u>	<u>1.03 min.</u>	<u>3.03 min.</u>

5. Support Systems (if No, record comment)

- | | | |
|--|---|-----------------------------|
| a. Door interlock functions properly | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/> |
| b. Beam status lights function properly | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/> |
| c. Viewing system functions properly | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/> |
| d. Treatment room doors function properly | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/> |
| e. Head swivel interlock prevents "beam-on" unless beam is directed toward floor | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/> |

COMMENT _____

Signature

Date

2-7-90

6. Calculations

- a. Beam analyzer calibration factor 105.29.
b. Expected output for 20 x 20 field at SSD 80 103.25.
c. Calculate output and timer error.

Output = 104.66 rad Timer error = -0.03 min.

- d. Output agrees with expected value to 1.4 %.

Physicist Alex Harbini

Date 2/7/90

COMMENT _____

$$\frac{.994}{.960} = \frac{1 + \Delta t}{1 + 2\Delta t}$$

$$.994 + 1.988 \Delta t = .960 + .960 \Delta t$$

$$1.028 \Delta t = -0.034$$

$$\Delta t = -.03$$

AECL MATRON 780 #253 -- MACHINE CHECK

Cobalt 60 Source NPI-20-6000W #T-577/017

6820 Ci as of 2/2/84
6890 10/14/89

1. Distance Indicators

- a. Lateral lasers are concentric to +1.2 mm.
b. With lasers skimming table, front pointer reads 80 cm.
c. With lasers skimming table, ODF reads 80 cm.

2. Radiation vs. Light Field Coincidence

- a. Ready pack film at SFD 80, collimator set 20.0 x 20.0 cm.²
b. Film and cover delivered to Physics.
c. Scribe marks measure 20 x 19.9 cm.²
d. Radiation and light coincidence to ±3 mm.

3. Output, Symmetry, Flatness, Timer Error

Using Protea RBA-3 Analyzer or _____:

- a. Beam analyzer in 20 x 20 field at SSD 80, zero all readouts, set timer for .6 minutes.
b. Irradiate beam analyzer and record "reading set No. 1."
c. Reset timer, zero analyzer, irradiate beam analyzer. Stop and restart beam one time approximately halfway through the irradiation. Record "reading set No. 2."

Ion Chamber No.					
Reading set No. 1	<u>.974</u>	<u>.964</u>	<u>.967</u>	<u>.969</u>	<u>.976</u>
Reading set No. 2	<u>.972</u>	<u>.964</u>	<u>.970</u>	<u>.968</u>	<u>.953</u>

4. Timer Linearity and Constancy

Set treatment timer to the following values and record backup timer readings:

Treatment Timer:	0.50 min.	1.00 min.	3.00 min.
Backup timer:	<u>.53 min.</u>	<u>1.03 min.</u>	<u>3.03 min.</u>

5. Support Systems (if No, record comment)

- | | | |
|--|---|-----------------------------|
| a. Door interlock functions properly | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/> |
| b. Beam status lights function properly | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/> |
| c. Viewing system functions properly | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/> |
| d. Treatment room doors function properly | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/> |
| e. Head swivel interlock prevents "beam-on" unless beam is directed toward floor | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/> |

COMMENT _____

May Drake RT
Signature

2-15-90
Date

6. Calculations

- a. Beam analyzer calibration factor 105.29.
b. Expected output for 20 x 20 field at SSD 80 103.25.
c. Calculate output and timer error.

Output = 102.76 rad Timer error = -0.02 min.

- d. Output agrees with expected value to 0.5 %.

Physicist Alex Halperin

Date 2/15/90

COMMENT _____

$$\frac{.976}{.955} = \frac{1 + \Delta t}{1 + 2\Delta t}$$

$$.976 + 1.952 \Delta t = .955 + .955 \Delta t$$

$$.997 \Delta t = -.021$$

$$\Delta t = -.02$$

AECL THERATRON 780 #253 -- MACHINE CHECK

Cobalt 60 Source NPI-20-6000W #T-677 1017

6820 Ci as of 2/2/84
6890 10/14/89

1. Distance Indicators

- a. Lateral lasers are concentric to +12 mm.
b. With lasers skimming table, front pointer reads 80 cm.
c. With lasers skimming table, ODF reads 80 cm.

2. Radiation vs. Light Field Coincidence

- a. Ready pack film at SSD 80, collimator set 20.0 x 20.0 cm.²
b. Film and cover delivered to Physics.
c. Scribe marks measure 19.9 x 20 cm.²
d. Radiation and light coincidence to ±3 mm.

3. Output, Symmetry, Flatness, Timer Error

Using Protea RBA-3 Analyzer or _____

- a. Beam analyzer in 20 x 20 field at SSD 80, zero all readouts, set timer for 10 minutes.
b. Irradiate beam analyzer and record "reading set No. 1."
c. Reset timer, zero analyzer, irradiate beam analyzer. Stop and restart beam one time approximately halfway through the irradiation. Record "reading set No. 2."

Ion Chamber No.					
Reading set No. 1	<u>969</u>	<u>967</u>	<u>956</u>	<u>974</u>	<u>973</u>
Reading set No. 2	<u>971</u>	<u>965</u>	<u>962</u>	<u>975</u>	<u>974</u> ?

4. Timer Linearity and Constancy

Set treatment timer to the following values and record backup timer readings:

Treatment Timer:	0.50 min.	1.00 min.	3.00 min.
Backup timer:	<u>0.53 min.</u>	<u>1.02 min.</u>	<u>3.03 min.</u>

5. Support Systems (if No, record comment)

- | | | |
|---|---|-----------------------------|
| a. Door interlock functions properly | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/> |
| b. Beam status lights function properly | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/> |
| c. Viewing system functions properly | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/> |
| d. Treatment room doors function properly | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/> |
| Off shield e. Head swivel interlock prevents "beam-on" unless beam is directed toward floor | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/> |

COMMENT _____

Judy Drake RPT 2-21-90
Signature Date

6. Calculations

- a. Beam analyzer calibration factor 105.29.
b. Expected output for 20 x 20 field at SSD 80 103.25.
c. Calculate output and timer error.

Output = 102.45 rad Timer error = .001 min.

- d. Output agrees with expected value to 0.3 %.

Physicist Alex Halperin

Date 2/21/90

COMMENT

Reading set 2 should be repeated.

$$\frac{.973}{.974} = \frac{1 + \Delta t}{1 + 2\Delta t}$$

$$.973 + 1.946 \Delta t = .974 + .974 \Delta t$$

$$.972 \Delta t = .001$$

$$\Delta t = .001 ?$$

AECL THERATRON 780 #253 - MACHINE CHECK
Cobalt 60 Source NPI-20-6000W #T-1017
6890 Ci as of 11/14/89

1. Distance Indicators

- a. Lateral lasers are concentric to ±.2 mm.
b. Set table to 80 SSD using front pointer, lasers reads 80 cm.
c. Set table to 80 SSD using front pointer, ODF reads 80 cm.

2. Radiation vs. Light Field Coincidence

- a. Ready pack film at SFD 80, set collimator to 20 X 20 cm.²
b. Film and cover delivered to Physics.
c. Scribe marks measure 19.9 X 19.9 cm.²
d. Radiation and light coincidence to ±3 mm.

3. Output, Symmetry, Flatness, Timer Error

Using Protea REA-3 Analyzer or _____

- a. Beam analyzer in 20 X 20 field at SSD 80, zero all readouts, set timer for 16 minutes.
b. Irradiate beam analyzer and record "reading set No. 1."
c. Reset timer, zero analyzer, irradiate beam analyzer. Stop and restart beam one time approximately halfway through the irradiation. Record "reading set No. 2."

Ion Chamber No.					
Reading set No. 1	<u>.973</u>	<u>.964</u>	<u>.962</u>	<u>.975</u>	<u>.980</u>
Reading set No. 2	<u>.971</u>	<u>.966</u>	<u>.965</u>	<u>.974</u>	<u>.960</u>

4. Timer Linearity and Constancy

Set treatment timer to the following values and record backup timer readings:

Treatment Timer:	0.50 min.	1.00 min	3.00 min.
Backup Timer:	<u>0.53 min.</u>	<u>1.03 min</u>	<u>3.02 min.</u>

5. Support Systems (if No, record comment)

a. Door interlock functions properly	YES	<u>X</u>	NO	_____
b. Beam status lights function properly	YES	<u>X</u>	NO	_____
c. Viewing system functions properly	YES	<u>X</u>	NO	_____
d. Treatment room doors function properly	YES	<u>X</u>	NO	_____
e. Off-shield interlock prevents "beam - on" unless beam is directed to floor	YES	<u>X</u>	NO	_____

Comment: _____

Judy Drake
Signature

2-28-90
Date

6. Calculations

- a. Beam analyzer calibration factor: 105.29
b. Expected output for 20 X 20 field at SSD 80 102.12
c. Calculate output and timer error.

Output = 103.18 rad Timer error = -0.02 min

- d. Output agrees with expected value to 1.0 %.

Physicist Alex Hahn, M.D.

Date 2/28/90

Comment: _____

$$\frac{.980}{.960} = \frac{1 + \Delta t}{1 + 2\Delta t}$$

$$.980 + 1.96 \Delta t = 0.960 + .960 \Delta t$$

$$1.0 \Delta t = -.02$$

$$\Delta t = -.02$$

AH/rp
co60

AECL THERATRON 780 #253 - MACHINE CHECK
Cobalt 60 Source NPI-20-6000W #T-1017
6890 Ci as of 11/14/89

1. Distance Indicators

- a. Lateral lasers are concentric to ± 2 mm.
- b. Set table to 80 SSD using front pointer, lasers reads 80 cm.
- c. Set table to 80 SSD using front pointer, ODF reads 80 cm.

2. Radiation vs. Light Field Coincidence

- a. Ready pack film at SFD 80, set collimator to 20 X 20 cm.²
- b. Film and cover delivered to Physics. 19.7
- c. Scribe marks measure 20.0/19.8 X 20.0 cm.²
- d. Radiation and light coincidence to ± 3 mm.

3. Output, Symmetry, Flatness, Timer Error

Using Protea RBA-3 Analyzer or _____

- a. Beam analyzer in 20 X 20 field at SSD 80, zero all readouts, set timer for 6 minutes.
- b. Irradiate beam analyzer and record "reading set No. 1."
- c. Reset timer, zero analyzer, irradiate beam analyzer. Stop and restart beam one time approximately halfway through the irradiation. Record "reading set No. 2."

Ion Chamber No.	1	2	3	4	5
Reading set No. 1	<u>971</u>	<u>965</u>	<u>963</u>	<u>972</u>	<u>985</u>
Reading set No. 2	<u>970</u>	<u>962</u>	<u>962</u>	<u>972</u>	<u>964</u>
	<u>1965</u>	<u>1963</u>	<u>1962</u>		

4. Timer Linearity and Constancy

Set treatment timer to the following values and record backup timer readings:

Treatment Timer:	0.50 min.	1.00 min	3.00 min.
Backup Timer:	<u>.53 min.</u>	<u>1.03 min</u>	<u>3.03 min.</u>

5. Support Systems (if No, record comment)

- a. Door interlock functions properly YES ☒ NO ☐
- b. Beam status lights function properly YES ☒ NO ☐
- c. Viewing system functions properly YES ☒ NO ☐
- d. Treatment room doors function properly YES ☒ NO ☐
- e. Off-shield interlock prevents "beam on" unless beam is directed to floor YES ☒ NO ☐

Comment: _____

M.A.
Signature

3-8-90
Date

AECL THERATRON 780 #253 - MACHINE CHECK
Cobalt 60 Source NPI-20-6000W #T-1017
6890 Ci as of 11/14/89

1. Distance Indicators

- a. Lateral lasers are concentric to 1.1 mm.
- b. Set table to 80 SSD using front pointer, lasers reads 80 cm.
- c. Set table to 80 SSD using front pointer, ODF reads 80 cm.

2. Radiation vs. Light Field Coincidence

- a. Ready pack film at SFD 80, set collimator to 20 X 20 cm.²
- b. Film and cover delivered to Physics.
- c. Scribe marks measure 20.2 X 20.2 cm.²
- d. Radiation and light coincidence to 1.3 mm.

3. Output, Symmetry, Flatness, Timer Error

Using Protea RBA-3 Analyzer or _____

- a. Beam analyzer in 20 X 20 field at SSD 80, zero all readouts, set timer for 6 minutes.
- b. Irradiate beam analyzer and record "reading set No. 1."
- c. Reset timer, zero analyzer, irradiate beam analyzer. Stop and restart beam one time approximately halfway through the irradiation. Record "reading set No. 2."

Ion Chamber No.	1	2	3	4	5
Reading set No. 1	<u>.976</u>	<u>.973</u>	<u>.970</u>	<u>.964</u>	<u>.983</u>
Reading set No. 2	<u>.975</u>	<u>.969</u>	<u>.966</u>	<u>.961</u>	<u>.961</u>

4. Timer Linearity and Constancy

Set treatment timer to the following values and record backup timer readings:

Treatment Timer:	0.50 min.	1.00 min	3.00 min.
Backup Timer:	<u>.52 min.</u>	<u>1.02 min</u>	<u>3.02 min.</u>

5. Support Systems (if No, record comment)

- | | | | | |
|---|-----|-------------------------------------|----|-------|
| a. Door interlock functions properly | YES | <input checked="" type="checkbox"/> | NO | _____ |
| b. Beam status lights function properly | YES | <input checked="" type="checkbox"/> | NO | _____ |
| c. Viewing system functions properly | YES | <input checked="" type="checkbox"/> | NO | _____ |
| d. Treatment room doors function properly | YES | <input checked="" type="checkbox"/> | NO | _____ |
| e. Off-shield interlock prevents "beam - on" unless beam is directed to floor | YES | <input checked="" type="checkbox"/> | NO | _____ |

Comment: _____

NGO DM
Signature

3-15-90
Date

6. Calculations

- a. Beam analyzer calibration factor 105.29
b. Expected output for 20 X 20 field at SSD 80 102.12
c. Calculate output and timer error.

Output = 103.50 rad Timer error = - .02 min

- d. Output agrees with expected value to 1.3 %.

Physicist Alex Hachimi, M.D.

Date 3/16/90

Comment: _____

$$\frac{.983}{.961} = \frac{14 \Delta t}{1 + 2 \Delta t}$$

$$.983 + 1.966 \Delta t = .961 + .961 \Delta t$$

$$1.005 \Delta t = -.022$$

$$\Delta t = -.021$$

AECL THERATRON 780 #253 - MACHINE CHECK
Cobalt 60 Source NPI-20-6000W #T-1017
6890 Ci as of 11/14/89

1. Distance Indicators

- a. Lateral lasers are concentric to ± 1 mm.
- b. Set table to 80 SSD using front pointer, lasers reads 80 cm.
- c. Set table to 80 SSD using front pointer, ODF reads 80 cm.

2. Radiation vs. Light Field Coincidence

- a. Ready pack film at SFD 80, set collimator to 20 X 20 cm.²
- b. Film and cover delivered to Physics. 19.8
- c. Scribe marks measure 2-19.9x 2-19.8 cm.²
- d. Radiation and light coincidence to ± 3 mm.

3. Output, Symmetry, Flatness, Timer Error

Using Protea RBA-3 Analyzer or _____

- a. Beam analyzer in 20 X 20 field at SSD 80, zero all readouts, set timer for 6 minutes.
- b. Irradiate beam analyzer and record "reading set No. 1."
- c. Reset timer, zero analyzer, irradiate beam analyzer. Stop and restart beam one time approximately halfway through the irradiation. Record "reading set No. 2."

Ion Chamber No.	1	2	3	4	5
Reading set No. 1	<u>.971</u>	<u>.964</u>	<u>.964</u>	<u>.964</u>	<u>.966</u>
Reading set No. 2	<u>.973</u>	<u>.963</u>	<u>.964</u>	<u>.964</u>	<u>.946</u>

4. Timer Linearity and Constancy

Set treatment timer to the following values and record backup timer readings:

Treatment Timer:	0.50 min.	1.00 min	3.00 min.
Backup Timer:	<u>.51 min.</u>	<u>1.03 min</u>	<u>3.03 min.</u>

5. Support Systems (if No, record comment)

- a. Door interlock functions properly YES ☒ NO ☐
- b. Beam status lights function properly YES ☒ NO ☐
- c. Viewing system functions properly YES ☒ NO ☐
- d. Treatment room doors function properly YES ☒ NO ☐
- e. Off-shield interlock prevents "beam - on" unless beam is directed to floor YES ☒ NO ☐

Comment: Field on light indicator works intermittently

Donald E. McPhail
Signature

3/23/90
Date

6. Calculations

- a. Beam analyzer calibration factor 105.29
 b. Expected output for 20 X 20 field at SSD 80 102.12
 c. Calculate output and timer error.

Output = 101.71 rad Timer error = -0.02 min

- d. Output agrees with expected value to 0.4 %.

Physicist Alex Halperin

Date 3/27/90

Comment: _____

$$\frac{.966}{.946} = \frac{1 + \Delta t}{1 + 2\Delta t}$$

$$.966 + 1.932 \Delta t = .946 + .946 \Delta t$$

$$.020 + .986 \Delta t = 0$$

$$\Delta t = -.02$$

AECL THERATRON 780 #253 - MACHINE CHECK
Cobalt 60 Source NPI-20-6000W #T-1017
6890 Ci as of 11/14/89

1. Distance Indicators

- a. Lateral lasers are concentric to 51 mm.
- b. Set table to 80 SSD using front pointer, lasers reads 80 cm.
- c. Set table to 80 SSD using front pointer, ODF reads 80 cm.

2. Radiation vs. Light Field Coincidence

- a. Ready pack film at SFD 80, set collimator to 20 X 20 cm.²
- b. Film and cover delivered to Physics.
- c. Scribe marks measure 20 X 20 cm.²
- d. Radiation and light coincidence to _____ mm.

3. Output, Symmetry, Flatness, Timer Error

Using Protea RBA-3 Analyzer or _____

- a. Beam analyzer in 20 X 20 field at SSD 80, zero all readouts, set timer for .6 minutes.
- b. Irradiate beam analyzer and record "reading set No. 1."
- c. Reset timer, zero analyzer, irradiate beam analyzer. Stop and restart beam one time approximately halfway through the irradiation. Record "reading set No. 2."

	<u>.971</u>	<u>.964</u>	<u>.962</u>	<u>.969</u>	<u>.975</u>
Ion Chamber No.	1	2	3	4	5
Reading set No. 1	<u>.971</u>	<u>.967</u>	<u>.961</u>	<u>.971</u>	<u>.976</u>
Reading set No. 2	_____	_____	_____	_____	_____

4. Timer Linearity and Constancy

Set treatment timer to the following values and record backup timer readings:

Treatment Timer:	0.50 min.	1.00 min	3.00 min.
Backup Timer:	_____ min.	_____ min	_____ min.

5. Support Systems (if No, record comment)

- a. Door interlock functions properly YES ☒ NO _____
- b. Beam status lights function properly YES ☒ NO _____
- c. Viewing system functions properly YES ☒ NO _____
- d. Treatment room doors function properly YES ☒ NO _____
- e. Off-shield interlock prevents "beam - on" unless beam is directed to floor YES ☒ NO _____

Comment: Source drawer ~~not~~ does not appear
visually

Don Melpolder
Signature

4-5-90
Date

6. Calculations

- a. Beam analyzer calibration factor 105.29
b. Expected output for 20 X 20 field at SSD 80 101.00
c. Calculate output and timer error.

Output = 102.76 rad Timer error = _____ min

- d. Output agrees with expected value to 1.7% %.

Physicist Alex Hashemi

Date 4/6/90

Comment: _____

AECL THERATRON 780 #253 - MACHINE CHECK
Cobalt 60 Source NPI-20-6000W #T-1017
6890 Ci as of 11/14/89

1. Distance Indicators

- a. Lateral lasers are concentric to + .1 mm.
- b. Set table to 80 SSD using front pointer, lasers reads 80 cm.
- c. Set table to 80 SSD using front pointer, ODF reads 80 cm.

2. Radiation vs. Light Field Coincidence

- a. Ready pack film at SFD 80, set collimator to 20 X 20 cm.²
- b. Film and cover delivered to Physics.
- c. Scribe marks measure 19.9 X 19.9 cm.²
- d. Radiation and light coincidence to ± 3 mm.

3. Output, Symmetry, Flatness, Timer Error

Using Protea RBA-3 Analyzer or _____

- a. Beam analyzer in 20 X 20 field at SSD 80, zero all readouts, set timer for 2.5 minutes.
- b. Irradiate beam analyzer and record "reading set No. 1."
- c. Reset timer, zero analyzer, irradiate beam analyzer. Stop and restart beam one time approximately halfway through the irradiation. Record "reading set No. 2."

Ion Chamber No.	1	2	3	4	5
Reading set No. 1	<u>.974</u>	<u>.962</u>	<u>.963</u>	<u>.968</u>	<u>.973</u>
Reading set No. 2	<u>.972</u>	<u>.962</u>	<u>.962</u>	<u>.968</u>	<u>.953</u>

4. Timer Linearity and Constancy

Set treatment timer to the following values and record backup timer readings:

Treatment Timer:	0.50 min.	1.00 min	3.00 min.
Backup Timer:	<u>.53 min.</u>	<u>1.07 min</u>	<u>2.03 min.</u>

5. Support Systems (if No, record comment)

- a. Door interlock functions properly YES ☒ NO ☐
- b. Beam status lights function properly YES ☒ NO ☐
- c. Viewing system functions properly YES ☒ NO ☐
- d. Treatment room doors function properly YES ☒ NO ☐
- e. Off-shield interlock prevents "beam - on" unless beam is directed to floor YES ☒ NO ☐

Comment: _____

Donald E. Melpolder 4/13/90
Signature Date

6. Calculations

- a. Beam analyzer calibration factor 105.29.
b. Expected output for 20 X 20 field at SSD 80 101.0.
c. Calculate output and timer error.

Output = 102.44 rad Timer error = -0.02 min

- d. Output agrees with expected value to 1.4 %.

Physicist Alex Hachemi, M.S.

Date 4/16/90

Comment: _____

$$\frac{.973}{.953} = \frac{1 + \Delta t}{1 + 2\Delta t}$$

$$.973 + 1.946 \Delta t = .953 + .953 \Delta t$$

$$.02 \Delta t = -.020$$

$$\Delta t = -.02$$

AECL THERATRON 780 #253 - MACHINE CHECK
Cobalt 60 Source NPI-20-6000W #T-1017
6890 Ci as of 11/14/89

1. Distance Indicators

- a. Lateral lasers are concentric to ±5 mm.
- b. Set table to 80 SSD using front pointer, lasers reads _____ cm.
- c. Set table to 80 SSD using front pointer, ODF reads _____ cm.

2. Radiation vs. Light Field Coincidence

- a. Ready pack film at SFD 80, set collimator to 20 X 20 cm.²
- b. Film and cover delivered to Physics.
- c. Scribe marks measure 20.1 X 20.0 cm.²
- d. Radiation and light coincidence to ±3 mm.

3. Output, Symmetry, Flatness, Timer Error

Using Protea RBA-3 Analyzer or _____

- a. Beam analyzer in 20 X 20 field at SSD 80, zero all readouts, set timer for 6 minutes.
- b. Irradiate beam analyzer and record "reading set No. 1."
- c. Reset timer, zero analyzer, irradiate beam analyzer. Stop and restart beam one time approximately halfway through the irradiation. Record "reading set No. 2."

Ion Chamber No.	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
Reading set No. 1	<u>975</u>	<u>971</u>	<u>969</u>	<u>975</u>	<u>960</u>
Reading set No. 2	<u>973</u>	<u>970</u>	<u>968</u>	<u>975</u>	<u>936</u>

4. Timer Linearity and Constancy

Set treatment timer to the following values and record backup timer readings:

Treatment Timer:	0.50 min.	1.00 min	3.00 min.
Backup Timer:	<u>.53 min.</u>	<u>1.03 min</u>	<u>3.03 min.</u>

5. Support Systems (if No, record comment)

- | | | | | |
|---|-----|----------|----|-------|
| a. Door interlock functions properly | YES | <u>X</u> | NO | _____ |
| b. Beam status lights function properly | YES | <u>X</u> | NO | _____ |
| c. Viewing system functions properly | YES | <u>X</u> | NO | _____ |
| d. Treatment room doors function properly | YES | <u>X</u> | NO | _____ |
| e. Off-shield interlock prevents "beam - on" unless beam is directed to floor | YES | <u>X</u> | NO | _____ |

Comment: Side lasers need adjustment

Imichowski ETT
Signature

30 April 90
Date

AECL THERATRON 790 #253 - MACHINE CHECK
Cobalt 60 Source NPI-20-6000W #T-1017
6890 Ci as of 11/14/89

1. Distance Indicators

- a. Lateral lasers are concentric to ±3 mm.
- b. Set table to 80 SSD using front pointer, lasers reads 80 cm.
- c. Set table to 80 SSD using front pointer, ODF reads 80 cm.

2. Radiation vs. Light Field Coincidence

- a. Ready pack film at SFD 80, set collimator to 20 X 20 cm.²
- b. Film and cover delivered to Physics.
- c. Scribe marks measure 20.2 X 20.0 cm.²
- d. Radiation and light coincidence to ±3 mm.

3. Output, Symmetry, Flatness, Timer Error

Using Protea RBA-3 Analyzer or _____

- a. Beam analyzer in 20 X 20 field at SSD 80, zero all readouts, set timer for .6 minutes.
- b. Irradiate beam analyzer and record "reading set No. 1."
- c. Reset timer, zero analyzer, irradiate beam analyzer. Stop and restart beam one time approximately halfway through the irradiation. Record "reading set No. 2."

Ion Chamber No.	1	2	3	4	5
Reading set No. 1	<u>.972</u>	<u>.969</u>	<u>.965</u>	<u>.975</u>	<u>.957</u>
Reading set No. 2	<u>.973</u>	<u>.972</u>	<u>.959</u>	<u>.978</u>	<u>.936</u>

4. Timer Linearity and Constancy

Set treatment timer to the following values and record backup timer readings:

Treatment Timer:	0.50 min.	1.00 min	3.00 min.
Backup Timer:	<u>.52 min.</u>	<u>1.03 min</u>	<u>3.03 min.</u>
	<u>.52</u>	<u>1.03</u>	<u>3.03</u>

5. Support Systems (if No, record comment)

- | | | | | |
|---|-----|----------|----|-------|
| a. Door interlock functions properly | YES | <u>X</u> | NO | _____ |
| b. Beam status lights function properly | YES | <u>X</u> | NO | _____ |
| c. Viewing system functions properly | YES | <u>X</u> | NO | _____ |
| d. Treatment room doors function properly | YES | <u>X</u> | NO | _____ |
| e. Off-shield interlock prevents "beam - on" unless beam is directed to floor | YES | <u>X</u> | NO | _____ |

Comment: _____

Signature

Date

Tim Chawlski RT(RT) 10 May 90

6. Calculations

- a. Beam analyzer calibration factor 105.29
- b. Expected output for 20 X 20 field at MSD 80 99.90
- c. Calculate output and timer error.

Output = 100.76 rad Timer error = -0.02 min

- d. Output agrees with expected value to 0.8 %.

Physicist Alex Haller

Date 5/14/90

Comment: I adjusted the layers to be concentric Att.

$$\frac{.957}{.936} = \frac{1 + \Delta t}{1 + 2\Delta t}$$

$$.957 + 1.914 \Delta t = .936 + .936 \Delta t$$

$$.021 \Delta t = -.021$$

$$\Delta t = -.02$$

AH/rp
co60

AECI THERATRON 780 #253 - MACHINE CHECK
Cobalt 60 Source NPI-20-6000W #T-1017
6890 Ci as of 11/14/89

1. Distance Indicators

- a. Lateral lasers are concentric to +1 mm.
- b. Set table to 80 SSD using front pointer, lasers reads 80 cm.
- c. Set table to 80 SSD using front pointer, ODF reads 80 cm.

2. Radiation vs. Light Field Coincidence

- a. Ready pack film at SPD 80, set collimator to 20 X 20 cm.²
- b. Film and cover delivered to Physics.
- c. Scribe marks measure 20.0 X 20.0 cm.²
- d. Radiation and light coincidence to _____ mm.

3. Output, Symmetry, Flatness, Timer Error

Using Protea RBA-3 Analyzer or _____

- a. Beam analyzer in 20 X 20 field at SSD 80, zero all readouts, set timer for 1.0 minutes.
- b. Irradiate beam analyzer and record "reading set No. 1."
- c. Reset timer, zero analyzer, irradiate beam analyzer. Stop and restart beam one time approximately halfway through the irradiation. Record "reading set No. 2."

Ion Chamber No.	1	2	3	4	5
Reading set No. 1	<u>974</u>	<u>967</u>	<u>971</u>	<u>968</u>	<u>961</u>
Reading set No. 2	<u>973</u>	<u>970</u>	<u>976</u>	<u>968</u>	<u>969</u>

4. Timer Linearity and Constancy

Set treatment timer to the following values and record backup timer readings:

Treatment Timer:	0.50 min.	1.00 min	3.00 min.
Backup Timer:	<u>0.53 min.</u>	<u>1.03 min</u>	<u>3.02 min.</u>

5. Support Systems (if No, record comment)

- | | | | | |
|---|-----|-------------------------------------|----|-------|
| a. Door interlock functions properly | YES | <input checked="" type="checkbox"/> | NO | _____ |
| b. Beam status lights function properly | YES | <input checked="" type="checkbox"/> | NO | _____ |
| c. Viewing system functions properly | YES | <input checked="" type="checkbox"/> | NO | _____ |
| d. Treatment room doors function properly | YES | <input checked="" type="checkbox"/> | NO | _____ |
| e. Off-shield interlock prevents "beam - on" unless beam is directed to floor | YES | <input checked="" type="checkbox"/> | NO | _____ |

Comment: _____

Imichowski (RT) 16 May 90
 Signature Date

6. Calculations

- a. Beam analyzer calibration factor 105.29
b. Expected output for 20 X 20 field at SSD 80 99.90.
c. Calculate output and timer error.

Output = 101.18 rad Timer error = -0.06 min

- d. Output agrees with expected value to 1.3 %.

Physicist Alex Halperin

Date 5/16/90

Comment: _____

$$\frac{.961}{.897} = \frac{1 + \Delta t}{1 + 2\Delta t}$$

$$.961 + 1.922 \Delta t = .897 + .897 \Delta t$$

$$1.025 \Delta t = -.064$$

$$\Delta t = -.06 \text{ ?}$$

AH/rp
co60

AECL THERATRON 780 #253 - MACHINE CHECK
Cobalt 60 Source NPI-20-6000W #T-1017
6890 Ci as of 11/14/89

1. Distance Indicators

- a. Lateral lasers are concentric to 71 mm.
b. Set table to 80 SSD using front pointer, lasers reads 80 cm.
c. Set table to 80 SSD using front pointer, ODF reads 80 cm.

2. Radiation vs. Light Field Coincidence

- a. Ready pack film at SFD 80, set collimator to 20 X 20 cm.²
b. Film and cover delivered to Physics.
c. Scribe marks measure 20.2 X 20.3 cm.²
d. Radiation and light coincidence to ±3 mm.

3. Output, Symmetry, Flatness, Timer Error

Using Protea RBA-3 Analyzer or _____

- a. Beam analyzer in 20 X 20 field at SSD 80, zero all readouts, set timer for 10 minutes.
b. Irradiate beam analyzer and record "reading set No. 1."
c. Reset timer, zero analyzer, irradiate beam analyzer. Stop and restart beam one time approximately halfway through the irradiation. Record "reading set No. 2."

Ion Chamber No.	1	2	3	4	5
Reading set No. 1	<u>978</u>	<u>967</u>	<u>969</u>	<u>976</u>	<u>965</u>
Reading set No. 2	<u>974</u>	<u>96</u>	<u>972</u>	<u>974</u>	<u>951</u>

4. Timer Linearity and Constancy

Set treatment timer to the following values and record backup timer readings:

Treatment Timer:	0.50 min.	1.00 min	3.00 min.
Backup Timer:	<u>0.52 min.</u>	<u>1.02 min</u>	<u>3.02 min.</u>

5. Support Systems (if No, record comment)

- | | | |
|---|---|-----------------------------|
| a. Door interlock functions properly | YES <input checked="" type="checkbox"/> | NO <input type="checkbox"/> |
| b. Beam status lights function properly | YES <input checked="" type="checkbox"/> | NO <input type="checkbox"/> |
| c. Viewing system functions properly | YES <input checked="" type="checkbox"/> | NO <input type="checkbox"/> |
| d. Treatment room doors function properly | YES <input checked="" type="checkbox"/> | NO <input type="checkbox"/> |
| e. Off-shield interlock prevents "beam - on" unless beam is directed to floor | YES <input checked="" type="checkbox"/> | NO <input type="checkbox"/> |

Comment: _____

J. Michowski
Signature

25 May 90
Date

6. Calculations

- a. Beam analyzer calibration factor 105.29
 b. Expected output for 20 X 20 field at SSD 80 99.90
 c. Calculate output and timer error.

Output = 101.49 rad Timer error = -0.014 min

- d. Output agrees with expected value to 1.6 %.

Physicist Alex Halhami

Date 5/25/90

Comment: _____

$$\frac{0.965}{0.951} = \frac{1 + \Delta t}{1 + 2 \Delta t}$$

$$.965 + 1.930 \Delta t = .951 + .951 \Delta t$$

$$0.979 \Delta t = -.014$$

$$\Delta t = -.014$$

AH/rp
 co60

AECL THERATRON 780 #253 - MACHINE CHECK
Cobalt 60 Source NPI-20-6000W #T-1017
6890 Ci as of 11/14/89

1. Distance Indicators

- a. Lateral lasers are concentric to 12 mm mm.
- b. Set table to 80 SSD using front pointer, lasers reads 7975 cm.
- c. Set table to 80 SSD using front pointer, ODF reads 871 cm.

2. Radiation vs. Light Field Coincidence

- a. Ready pack film at SFD 80, set collimator to 20 X 20 cm.²
- b. Film and cover delivered to Physics.
- c. Scribe marks measure 20.2 X 20.2 cm.²
- d. Radiation and light coincidence to _____ mm.

3. Output, Symmetry, Flatness, Timer Error

Using Protea RBA-3 Analyzer or _____

- a. Beam analyzer in 20 X 20 field at SSD 80, zero all readouts, set timer for 0.6 minutes.
- b. Irradiate beam analyzer and record "reading set No. 1."
- c. Reset timer, zero analyzer, irradiate beam analyzer. Stop and restart beam one time approximately halfway through the irradiation. Record "reading set No. 2."

Ion Chamber No.	1	2	3	4	5
Reading set No. 1	<u>970</u>	<u>971</u>	<u>963</u>	<u>977</u>	<u>947</u>
Reading set No. 2	<u>970</u>	<u>965</u>	<u>965</u>	<u>936</u>	<u>931</u>

4. Timer Linearity and Constancy

Set treatment timer to the following values and record backup timer readings:

Treatment Timer:	0.50 min.	1.00 min	3.00 min.
Backup Timer:	<u>.52 min.</u>	<u>1.02 min</u>	<u>3.02 min.</u>

5. Support Systems (if No, record comment)

- a. Door interlock functions properly YES X NO _____
- b. Beam status lights function properly YES X NO _____
- c. Viewing system functions properly YES X NO _____
- d. Treatment room doors function properly YES X NO _____
- e. Off-shield interlock prevents "beam on" unless beam is directed to floor YES X NO _____

Comment: _____

ymichowski RTT
Signature

6 June 90
Date

6. Calculations

- a. Beam analyzer calibration factor 105.29
b. Expected output for 20 X 20 field at SSD 80 98.81.
c. Calculate output and timer error.

Output = 99.71 rad Timer error = -0.017 min

- d. Output agrees with expected value to 0.9 %.

Physicist Alex Hashemi

Date 6/6/90

Comment: _____

$$\frac{.947}{.931} = \frac{1 + \Delta t}{1 + 2\Delta t}$$

$$.947 + 1.894 \Delta t = .931 + .931 \Delta t$$

$$.016 \Delta t = -.016$$

$$\Delta t = -.017$$

AECL THERATRON 780 #253 - MACHINE CHECK
Cobalt 60 Source NPI-20-6000W #T-1017
6890 Ci as of 11/14/89

1. Distance Indicators

- a. Lateral lasers are concentric to ±2 mm mm.
- b. Set table to 80 SSD using front pointer, lasers reads 80 cm.
- c. Set table to 80 SSD using front pointer, ODF reads 80 cm.

2. Radiation vs. Light Field Coincidence

- a. Ready pack film at SFD 80, set collimator to 20 X 20 cm.²
- b. Film and cover delivered to Physics.
- c. Scribe marks measure 20.1 X 20.0 cm.²
- d. Radiation and light coincidence to ±3 mm.

3. Output, Symmetry, Flatness, Timer Error

Using Protea RBA-3 Analyzer or _____

- a. Beam analyzer in 20 X 20 field at SSD 80, zero all readouts, set timer for 1.6 minutes.
- b. Irradiate beam analyzer and record "reading set No. 1."
- c. Reset timer, zero analyzer, irradiate beam analyzer. Stop and restart beam one time approximately halfway through the irradiation. Record "reading set No. 2."

Ion Chamber No.					
Reading set No. 1	<u>983</u>	<u>978</u>	<u>973</u>	<u>986</u>	<u>976</u>
Reading set No. 2	<u>952</u>	<u>971</u>	<u>972</u>	<u>980</u>	<u>970</u>

4. Timer Linearity and Constancy

Set treatment timer to the following values and record backup timer readings:

Treatment Timer:	0.50 min.	1.00 min	3.00 min.
Backup Timer:	<u>0.53 min.</u>	<u>1.03 min</u>	<u>3.03 min.</u>

5. Support Systems (if No, record comment)

- | | | | | |
|---|-----|----------|----|-------|
| a. Door interlock functions properly | YES | <u>X</u> | NO | _____ |
| b. Beam status lights function properly | YES | <u>X</u> | NO | _____ |
| c. Viewing system functions properly | YES | <u>X</u> | NO | _____ |
| d. Treatment room doors function properly | YES | <u>X</u> | NO | _____ |
| e. Off-shield interlock prevents "beam - on" unless beam is directed to floor | YES | _____ | NO | _____ |

Comment: _____

Michowski KIT
Signature

21 June 90
Date

6. Calculations

- a. Beam analyzer calibration factor 105.29
b. Expected output for 20 X 20 field at SSD 80 98.81.
c. Calculate output and timer error.

Output = 98.55 rad Timer error = -0.027 min

- d. Output agrees with expected value to 0.3 %.

Physicist Alex Hashemi

Date 6/25/90

Comment: _____

$$\frac{.936}{.910} = \frac{1 + \Delta t}{1 + 2\Delta t}$$

$$0.936 + 1.872 \Delta t = 0.910 + 0.910 \Delta t$$

$$0.962 \Delta t = -.026$$

$$\Delta t = -.027$$

AECL THERATRON 780 #253 - MACHINE CHECK
Cobalt 60 Source NPI-20-600CW #T-1017
6890 Ci as of 11/14/89

ally adjusted

1. Distance Indicators

- a. Lateral lasers are concentric to ± 5 mm.
b. Set table to 80 SSD using front pointer, lasers reads 80 cm.
c. Set table to 80 SSD using front pointer, ODF reads 80 cm.

2. Radiation vs. Light Field Coincidence

- a. Ready pack film at SFD 80, set collimator to 20 X 20 cm.²
b. Film and cover delivered to Physics.
c. Scribe marks measure ± 20 X ± 20 cm.²
d. Radiation and light coincidence to ± 3 mm.

3. Output, Symmetry, Flatness, Timer Error

Using Protea RBA-3 Analyzer or _____

- a. Beam analyzer in 20 X 20 field at SSD 80, zero all readouts, set timer for 16 minutes.
b. Irradiate beam analyzer and record "reading set No. 1."
c. Reset timer, zero analyzer, irradiate beam analyzer. Stop and restart beam one time approximately halfway through the irradiation. Record "reading set No. 2."

Ion Chamber No.	1	2	3	4	5
Reading set No. 1	<u>1978</u>	<u>1973</u>	<u>1968</u>	<u>1982</u>	<u>1933</u>
Reading set No. 2	<u>1979</u>	<u>1970</u>	<u>1968</u>	<u>1984</u>	<u>1915</u>

4. Timer Linearity and Constancy

Set treatment timer to the following values and record backup timer readings:

Treatment Timer:	0.50 min.	1.00 min	3.00 min.
Backup Timer:	<u>.53 min.</u>	<u>1.02 min</u>	<u>3.03 min.</u>

5. Support Systems (if No, record comment)

- | | | | | |
|---|-----|-------------------------------------|----|-------|
| a. Door interlock functions properly | YES | <input checked="" type="checkbox"/> | NO | _____ |
| b. Beam status lights function properly | YES | <input checked="" type="checkbox"/> | NO | _____ |
| c. Viewing system functions properly | YES | <input checked="" type="checkbox"/> | NO | _____ |
| d. Treatment room doors function properly | YES | <input checked="" type="checkbox"/> | NO | _____ |
| e. Off-shield interlock prevents "beam - on" unless beam is directed to floor | YES | <input checked="" type="checkbox"/> | NO | _____ |

Comment: _____

Michowski (RTIRX) 27 June 90
Signature Date

6. Calculations

- a. Beam analyzer calibration factor 105.29
b. Expected output for 20 X 20 field at SSD 80 98.81
c. Calculate output and timer error.

Output = 98.23 rad Timer error = -0.021 min

- d. Output agrees with expected value to 0.6 %.

Physicist Alex Hetherington

Date 6/27/90

Comment: _____

$$\frac{.933}{.913} = \frac{1 + \Delta t}{1 + 2\Delta t}$$

$$.933 + 1.866 \Delta t = .913 + .913 \Delta t$$

$$0.020 \Delta t = -.020$$

$$\Delta t = -.021$$

AECL THERATRON 780 #253 - MACHINE CHECK
Cobalt 60 Source NPI-20-6000W #T-1017
6890 Ci as of 11/14/89

1. Distance Indicators

- a. Lateral lasers are concentric to ± 2 mm.
- b. Set table to 80 SSD using front pointer, lasers reads 80 cm.
- c. Set table to 80 SSD using front pointer, ODF reads 80 cm.

2. Radiation vs. Light Field Coincidence

- a. Ready pack film at SFD 80, set collimator to 20 X 20 cm.²
- b. Film and cover delivered to Physics.
- c. Scribe marks measure 20.2 X 20.3 cm.²
- d. Radiation and light coincidence to ± 3 mm.

3. Output, Symmetry, Flatness, Timer Error

Using Protea RBA-3 Analyzer or _____

- a. Beam analyzer in 20 X 20 field at SSD 80, zero all readouts, set timer for _____ minutes.
- b. Irradiate beam analyzer and record "reading set No. 1."
- c. Reset timer, zero analyzer, irradiate beam analyzer. Stop and restart beam one time approximately halfway through the irradiation. Record "reading set No. 2."

Ion Chamber No.					
Reading set No. 1	<u>987</u>	<u>985</u>	<u>983</u>	<u>988</u>	<u>922</u>
Reading set No. 2	<u>986</u>	<u>986</u>	<u>979</u>	<u>991</u>	<u>903</u>

4. Timer Linearity and Constancy

Set treatment timer to the following values and record backup timer readings:

Treatment Timer:	0.50 min.	1.00 min	3.00 min.
Backup Timer:	<u>.53 min.</u>	<u>1.03 min</u>	<u>3.03 min.</u>

5. Support Systems (if No, record comment)

- | | | | | |
|---|-----|----------|----|-------|
| a. Door interlock functions properly | YES | <u>X</u> | NO | _____ |
| b. Beam status lights function properly | YES | <u>X</u> | NO | _____ |
| c. Viewing system functions properly | YES | <u>X</u> | NO | _____ |
| d. Treatment room doors function properly | YES | <u>X</u> | NO | _____ |
| e. Off-shield interlock prevents "beam - on" unless beam is directed to floor | YES | <u>X</u> | NO | _____ |

Comment: _____

Michowski (RTD) 11 July 90
 Signature Date

6. Calculations

- a. Beam analyzer calibration factor 105.29
b. Expected output for 20 X 20 field at SSD 80 97.72.
c. Calculate output and timer error.

Output = 97.08 rad Timer error = -.020 min

- d. Output agrees with expected value to 0.7 %.

Physicist Alex Hashemi

Date 7/11/90

Comment: _____

$$\frac{.922}{.903} = \frac{1 + \Delta t}{1 + 2\Delta t}$$

$$.922 + 1.844 \Delta t = .903 + .903 \Delta t$$

$$.941 \Delta t = -.019$$

$$\Delta t = -.020$$

AH/rp
co60

AECL THERATRON 780 #253 - MACHINE CHECK
Cobalt 60 Source NPI-20-6000W #T-1017
6890 Ci as of 11/14/89

1. Distance Indicators

- Lateral lasers are concentric to 72 mm mm.
- Set table to 80 SSD using front pointer, lasers reads 80 cm.
- Set table to 80 SSD using front pointer, ODF reads 80 cm.

2. Radiation vs. Light Field Coincidence

- Ready pack film at SFD 80, set collimator to 20 X 20 cm.²
- Film and cover delivered to Physics.
- Scribe marks measure 1.18 X 1.18 cm.²
- Radiation and light coincidence to 1.18 mm.

3. Output, Symmetry, Flatness, Timer Error

Using Protea RBA-3 Analyzer or _____

- Beam analyzer in 20 X 20 field at SSD 80, zero all readouts, set timer for _____ minutes.
- Irradiate beam analyzer and record "reading set No. 1."
- Reset timer, zero analyzer, irradiate beam analyzer. Stop and restart beam one time approximately halfway through the irradiation. Record "reading set No. 2."

Ion Chamber No.	1	2	3	4	5
Reading set No. 1	<u>987</u>	<u>978</u>	<u>974</u>	<u>987</u>	<u>907</u>
Reading set No. 2	<u>976</u>	<u>979</u>	<u>974</u>	<u>986</u>	<u>903</u>

4. Timer Linearity and Constancy

Set treatment timer to the following values and record backup timer readings:

Treatment Timer:	0.50 min.	1.00 min	3.00 min.
Backup Timer:	<u>0.53 min.</u>	<u>1.03 min</u>	<u>3.03 min.</u>

5. Support Systems (if No, record comment)

- | | | | | |
|---|-----|----------|----|-------|
| a. Door interlock functions properly | YES | <u>X</u> | NO | _____ |
| b. Beam status lights function properly | YES | <u>X</u> | NO | _____ |
| c. Viewing system functions properly | YES | <u>X</u> | NO | _____ |
| d. Treatment room doors function properly | YES | <u>X</u> | NO | _____ |
| e. Off-shield interlock prevents "beam - on" unless beam is directed to floor | YES | <u>✓</u> | NO | _____ |

Comment: _____

Signature

Date

Michowski R.T. 25 July 90
James Boussem R.T. (A)

6. Calculations

- a. Beam analyzer calibration factor 115.29.
- b. Expected output for 20 X 20 field at SSD 80 97.72.
- c. Calculate output and timer error.

Output = 95.57 rad Timer error = +0.0011 min

- d. Output agrees with expected value to 229 %.

Physicist Agnes L. L. L.

Date 7/27/90

Comment: Need to do it again

$$\frac{0.907}{0.908} = \frac{1 + \Delta t}{1 + 2\Delta t}$$

$$0.907 + 1.814\Delta t = 0.908 + 1.816\Delta t$$

$$0.906\Delta t = 0.001$$

$$\Delta t = 0.0011$$

AECL THERATRON 780 #253 - MACHINE CHECK
Cobalt 60 Source NPI-20-6000W #T-1017
6890 Ci as of 11/14/89

1. Distance Indicators

- Lateral lasers are concentric to 2m mm.
- Set table to 80 SSD using front pointer, lasers reads 80 cm.
- Set table to 80 SSD using front pointer, ODF reads 80 cm.

2. Radiation vs. Light Field Coincidence

- Ready pack film at SFD 80, set collimator to 20 X 20 cm.²
- Film and cover delivered to Physics.
- Scribe marks measure 19.9 X 19.9 cm.²
- Radiation and light coincidence to 3 mm.

3. Output, Symmetry, Flatness, Timer Error

Using Protea RBA-3 Analyzer or _____

- Beam analyzer in 20 X 20 field at SSD 80, zero all readouts, set timer for .6 minutes.
- Irradiate beam analyzer and record "reading set No. 1."
- Reset timer, zero analyzer, irradiate beam analyzer. Stop and restart beam one time approximately halfway through the irradiation. Record "reading set No. 2."

Ion Chamber No.	1	2	3	4	5
Reading set No. 1	<u>978</u>	<u>976</u>	<u>971</u>	<u>978</u>	<u>920</u>
Reading set No. 2	<u>979</u>	<u>975</u>	<u>970</u>	<u>976</u>	<u>908</u>
	<u>978</u>	<u>975</u>	<u>971</u>	<u>976</u>	<u>908</u>

4. Timer Linearity and Constancy

Set treatment timer to the following values and record backup timer readings:

Treatment Timer:	0.50 min.	1.00 min	3.00 min.
Backup Timer:	<u>.53 min.</u>	<u>1.03 min</u>	<u>3.03 min.</u>

5. Support Systems (if No, record comment)

- Door interlock functions properly YES ☒ NO _____
- Beam status lights function properly YES ☒ NO _____
- Viewing system functions properly YES ☒ NO _____
- Treatment room doors function properly YES ☒ NO _____
- Off-shield interlock prevents "beam - on" unless beam is directed to floor YES ☒ NO _____

Comment: _____

Michowski RT(RT)
Signature

6 August 1990
Date

6. Calculations

- a. Beam analyzer calibration factor 105.29.
- b. Expected output for 20 X 20 field at SSD 80 96.45.
- c. Calculate output and timer error.

Output = 96.87 rad Timer error = 0.013 min

- d. Output agrees with expected value to +0.2 %.

Physicist Agnes Devate

Date 8/3/90

Comment: Devate has adjusted digital timer on 8/3/90.

$$\frac{0.920}{0.908} = \frac{1 + \Delta t}{1 + 2 \Delta t}$$

$$0.920 + 1.84 \Delta t = 0.908 + 0.908 \Delta t$$

$$0.012 \Delta t = -0.012$$

$$\Delta t = \underline{\underline{-0.013}}$$

AECL THERATRON 780 #253 - MACHINE CHECK
Cobalt 60 Source NPI-20-6000W #T-1017
6890 Ci as of 11/14/89

1. Distance Indicators

- a. Lateral lasers are concentric to 12 mm mm.
- b. Set table to 80 SSD using front pointer, lasers reads 80 cm.
- c. Set table to 80 SSD using front pointer, ODF reads 80 cm.

2. Radiation vs. Light Field Coincidence

- a. Ready pack film at SSD 80, set collimator to 20 X 20 cm.²
- b. Film and cover delivered to Physics.
- c. Scribe marks measure 20.0 X 20.0 cm.²
- d. Radiation and light coincidence to _____ mm.

3. Output, Symmetry, Flatness, Timer Error

Using Protea RBA-3 Analyzer or _____

- a. Beam analyzer in 20 X 20 field at SSD 80, zero all readouts, set timer for .6 minutes.
- b. Irradiate beam analyzer and record "reading set No. 1."
- c. Reset timer, zero analyzer, irradiate beam analyzer. Stop and restart beam one time approximately halfway through the irradiation. Record "reading set No. 2."

Ion Chamber No.	1	2	3	4	5
Reading set No. 1	<u>.987</u>	<u>.981</u>	<u>.982</u>	<u>.985</u>	<u>.912</u>
Reading set No. 2	<u>.986</u>	<u>.984</u>	<u>.986</u>	<u>.986</u>	<u>.992</u>

4. Timer Linearity and Constancy

Set treatment timer to the following values and record backup timer readings:

Treatment Timer:	0.50 min.	1.00 min	3.00 min.
Backup Timer:	<u>.53 min.</u>	<u>1.03 min</u>	<u>3.03 min.</u>

5. Support Systems (if No, record comment)

- a. Door interlock functions properly YES ☒ NO _____
- b. Beam status lights function properly YES ☒ NO _____
- c. Viewing system functions properly YES ☒ NO _____
- d. Treatment room doors function properly YES ☒ NO _____
- e. Off-shield interlock prevents "beam on" unless beam is directed to floor YES ☒ NO _____

Comment: _____

Signature

Date

K. Campbell
2/8/89

8-16-90

6. Calculations

- a. Beam analyzer calibration factor 115.21
- b. Expected output for 20 X 20 field at SSD 80 96.65
- c. Calculate output and timer error.

Output = 96.13 rad Timer error = -1.12 min

d. Output agrees with expected value to + 0.11%

Physicist James Drake

Date 5/17/90

Comment: _____

$$\frac{0.912}{0.892} = \frac{1 + \Delta t}{1 + 2\Delta t}$$

$$0.912 + 1.824 \Delta t = 0.892 + 1.784 \Delta t$$

$$0.932 \Delta t = -0.02$$

$$\Delta t = \frac{-0.02}{0.932}$$

$$= \underline{\underline{-0.0215}}$$

AECL THERATRON 780 #253 - MACHINE CHECK
Cobalt 60 Source NPI-20-6000W #T-1017
6890 Ci as of 11/14/89

1. Distance Indicators

- a. Lateral lasers are concentric to ± 2 mm.
b. Set table to 80 SSD using front pointer, lasers reads 80 cm.
c. Set table to 80 SSD using front pointer, ODF reads 80 cm.

2. Radiation vs. Light Field Coincidence

- a. Ready pack film at SPD 80, set collimator to 20 X 20 cm.²
b. Film and cover delivered to Physics.
c. Scribe marks measure 20.0 X 20.0 cm.²
d. Radiation and light coincidence to 2.2 mm.

3. Output, Symmetry, Flatness, Timer Error

Using Protea RBA-3 Analyzer or _____

- a. Beam analyzer in 20 X 20 field at SSD 80, zero all readouts, set timer for _____ minutes.
b. Irradiate beam analyzer and record "reading set No. 1."
c. Reset timer, zero analyzer, irradiate beam analyzer. Stop and restart beam one time approximately halfway through the irradiation. Record "reading set No. 2."

Ion Chamber No.	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
Reading set No. 1	<u>984</u>	<u>981</u>	<u>978</u>	<u>980</u>	<u>998</u>
Reading set No. 2	<u>987</u>	<u>981</u>	<u>980</u>	<u>982</u>	<u>978</u>
	<u>982</u>	<u>985</u>	<u>977</u>	<u>984</u>	<u>967</u>

4. Timer Linearity and Constancy

Set treatment timer to the following values and record backup timer readings:

Treatment Timer:	0.50 min.	1.00 min	3.00 min.
Backup Timer:	<u>.53 min.</u>	<u>1.03 min</u>	<u>3.03 min.</u>

5. Support Systems (if No, record comment)

- a. Door interlock functions properly YES ☒ NO _____
b. Beam status lights function properly YES ☒ NO _____
c. Viewing system functions properly YES ☒ NO _____
d. Treatment room doors function properly YES ☒ NO _____
e. Off-shield interlock prevents "beam - on" unless beam is directed to floor YES ☒ NO _____

Comment: _____

MART
Signature

8-24-90
Date

6. Calculations

- a. Beam analyzer calibration factor 10.5.29
- b. Expected output for 20 X 20 field at SSD 80 95.61
- c. Calculate output and timer error.

Output = 94.55 rad Timer error = -0.02 min

1. Output agrees with expected value to 1.1 %.

Physicist James L. Galt

Date 9/24/90

Comment: _____

$$\frac{0.898}{0.878} = \frac{1 + \Delta t}{1 + 2\Delta t}$$

$$0.898 + 1.796 \Delta t = 0.878 + 1.756 \Delta t$$

$$0.02 \Delta t = -0.02$$

$$\Delta t = -0.0218$$

AECL THERATRON 780 #253 - MACHINE CHECK
Cobalt 60 Source NPI-20-6060W #T-1017
6890 Ci as of 11/14/89

1. Distance Indicators

- a. Lateral lasers are concentric to ± 2 mm.
- b. Set table to 80 SSD using front pointer, lasers reads 90 cm.
- c. Set table to 80 SSD using front pointer, ODF reads 90 cm.

2. Radiation vs. Light Field Coincidence

- a. Ready pack film at SFD 80, set collimator to 20 X 20 cm.²
- b. Film and cover delivered to Physics.
- c. Scribe marks measure 20.0/15.1 X 20.0/14.2 cm.²
- d. Radiation and light coincidence to 7 mm.

3. Output, Symmetry, Flatness, Timer Error

Using Protea RBA-3 Analyzer or _____

- a. Beam analyzer in 20 X 20 field at SSD 80, zero all readouts, set timer for 0.6 minutes.
- b. Irradiate beam analyzer and record "reading set No. 1."
- c. Reset timer, zero analyzer, irradiate beam analyzer. Stop and restart beam one time approximately halfway through the irradiation. Record "reading set No. 2."

Ion Chamber No.	1	2	3	4	5
Reading set No. 1	<u>.995</u>	<u>.992</u>	<u>.978</u>	<u>.971</u>	<u>.899</u>
Reading set No. 2	<u>.982</u>	<u>.987</u>	<u>.979</u>	<u>.982</u>	<u>.849</u>

4. Timer Linearity and Constancy

Set treatment timer to the following values and record backup timer readings:

Treatment Timer:	0.50 min.	1.00 min	3.00 min.
Backup Timer:	<u>.54 min.</u>	<u>1.03 min</u>	<u>4.03 min.</u>

5. Support Systems (if No, record comment)

- a. Door interlock functions properly YES ☒ NO _____
- b. Beam status lights function properly YES ☒ NO _____
- c. Viewing system functions properly YES ☒ NO _____
- d. Treatment room doors function properly YES ☒ NO _____
- e. Off-shield interlock prevents "beam - on" unless beam is directed to floor YES ☒ NO _____

Comment: _____

NGA RT
Signature

8-31-90
Date

6. Calculations

- a. Beam analyzer calibration factor 105.2
 b. Expected output for 20 X 20 field at SSD 80 95.6
 c. Calculate output and timer error.

Output = 94.66 rad Timer error = -3 min

- d. Output agrees with expected value to -0.98

Physicist C. A. Dunn, M.D.

Date 5/31/90

Comment: _____

$$\frac{0.899}{0.865} = \frac{1 + \Delta t}{1 + 2\Delta t}$$

$$0.899 + 1.798 \Delta t = 0.865 + 0.865 \Delta t$$

$$0.929 \Delta t = -0.03$$

$$\Delta t = \underline{\underline{-0.03}}$$

AECL THERATRON 780 #253 - MACHINE CHECK
Cobalt 60 Source NPI-20-6000W #T-1017
6890 Ci as of 11/14/89

1. Distance Indicators

- a. Lateral lasers are concentric to + 2 mm.
- b. Set table to 80 SSD using front pointer, lasers reads 80 cm.
- c. Set table to 80 SSD using front pointer, ODF reads 80 cm.

2. Radiation vs. Light Field Coincidence

- a. Ready pack film at SPD 80, set collimator to 20 X 20 cm.²
- b. Film and cover delivered to Physics.
- c. Scribe marks measure 20.02 X 20.04 cm.²
- d. Radiation and light coincidence to 2 mm.

3. Output, Symmetry, Flatness, Timer Error

Using Protea RBA-3 Analyzer or _____

- a. Beam analyzer in 20 X 20 field at SSD 80, zero all readouts, set timer for 6.4 minutes.
- b. Irradiate beam analyzer and record "reading set No. 1."
- c. Reset timer, zero analyzer, irradiate beam analyzer. Stop and restart beam one time approximately halfway through the irradiation. Record "reading set No. 2."

Ion Chamber No.	1	2	3	4	5
Reading set No. 1	<u>984</u>	<u>984</u>	<u>975</u>	<u>985</u>	<u>892</u>
Reading set No. 2	<u>975</u>	<u>984</u>	<u>978</u>	<u>985</u>	<u>874</u>

4. Timer Linearity and Constancy

Set treatment timer to the following values and record backup timer readings:

Treatment Timer:	0.50 min.	1.00 min	3.00 min.
Backup Timer:	<u>.52 min.</u>	<u>1.03 min</u>	<u>3.03 min.</u> ✓

5. Support Systems (if No, record comment)

- | | | | | |
|---|-----|-------------------------------------|----|-------|
| a. Door interlock functions properly | YES | <input checked="" type="checkbox"/> | NO | _____ |
| b. Beam status lights function properly | YES | <input checked="" type="checkbox"/> | NO | _____ |
| c. Viewing system functions properly | YES | <input checked="" type="checkbox"/> | NO | _____ |
| d. Treatment room doors function properly | YES | <input checked="" type="checkbox"/> | NO | _____ |
| e. Off-shield interlock prevents "beam - on" unless beam is directed to floor | YES | <input checked="" type="checkbox"/> | NO | _____ |

Comment: _____

Ng R AT
Signature

9-7-90
Date

6. Calculations

- a. Beam analyzer calibration factor 115.29
- b. Expected output for 20 X 20 field at SSD 80 95.60
- c. Calculate output and timer error.

Output = 93.92 rad Timer error = -1.2 min

- d. Output agrees with expected value to -1.74 %.

Physicist (Adrian Leung)

Date 9/5/90

Comment: _____

$$\frac{0.892}{0.874} = \frac{1 + \Delta t}{1 + 2\Delta t}$$

$$0.892 + 1.754 \Delta t = 0.874 + 1.748 \Delta t$$

$$0.018 = -0.018 \Delta t$$

$$\Delta t = -0.02$$

AECL THERATRON 780 #253 - MACHINE CHECK
Cobalt 60 Source NPI-20-6000W #T-1017
6890 Ci as of 11/14/89

1. Distance Indicators

- a. Lateral lasers are concentric to 12 mm.
- b. Set table to 80 SSD using front pointer, lasers reads 82.0 cm.
- c. Set table to 80 SSD using front pointer, ODF reads 82.0 cm.

2. Radiation vs. Light Field Coincidence

- a. Ready pack film at SFD 80, set collimator to 20 X 20 cm.²
- b. Film and cover delivered to Physics.
- c. Scribe marks measure 20.0 X 20.0 cm.²
- d. Radiation and light coincidence to 2 mm.

3. Output, Symmetry, Flatness, Timer Error

Using Protea RBA-3 Analyzer or _____

- a. Beam analyzer in 20 X 20 field at SSD 80, zero all readouts, set timer for 5.45 minutes.
- b. Irradiate beam analyzer and record "reading set No. 1."
- c. Reset timer, zero analyzer, irradiate beam analyzer. Stop and restart beam one time approximately halfway through the irradiation. Record "reading set No. 2."

Ion Chamber No.	1	2	3	4	5
Reading set No. 1	<u>982</u>	<u>973</u>	<u>971</u>	<u>952</u>	<u>895</u>
Reading set No. 2	<u>981</u>	<u>976</u>	<u>973</u>	<u>981</u>	<u>883</u>

4. Timer Linearity and Constancy

Set treatment timer to the following values and record backup timer readings:

Treatment Timer:	0.50 min	1.00 min	3.00 min.
Backup Timer:	<u>.53 min.</u>	<u>1.03 min</u>	<u>3.03 min.</u>

5. Support Systems (if No, record comment)

- a. Door interlock functions properly YES ☒ NO ☐
- b. Beam status lights function properly YES ☒ NO ☐
- c. Viewing system functions properly YES ☒ NO ☐
- d. Treatment room doors function properly YES ☒ NO ☐
- e. Off-shield interlock prevents "beam - on" unless beam is directed to floor YES ☒ NO ☐

Comment: _____

M. B. R. T.
Signature

9-17-90
Date

6. Calculations

- a. Beam analyzer calibration factor 105.24.
- b. Expected output for 20 X 20 field at SSD 80 95.6.
- c. Calculate output and timer error.

Output = 94.23 rad Timer error = -0.0132 min

- d. Output agrees with expected value to -1.43 %.

Physicist Ann L. L. L.

Date 2/20/90

Comment: _____

$$\frac{0.895}{0.853} = \frac{1 + \Delta t}{1 + 2 \Delta t}$$

$$0.895 + 1.79 \Delta t = 0.853 + 0.853 \Delta t$$

$$0.042 \Delta t = -0.012$$

$$\Delta t = -0.0132$$

AECL THERATRON 780 #253 - MACHINE CHECK
Cobalt 60 Source NPI-20-6000W #T-1017
6890 Ci as of 11/14/89

1. Distance Indicators

- a. Lateral lasers are concentric to 1 mm.
b. Set table to 80 SSD using front pointer, lasers reads 80 cm.
c. Set table to 80 SSD using front pointer, ODF reads 80 cm.

2. Radiation vs. Light Field Coincidence

- a. Ready pack film at SFD 80, set collimator to 20 X 20 cm.²
b. Film and cover delivered to Physics.
c. Scribe marks measure _____ X _____ cm.²
d. Radiation and light coincidence to _____ mm.

3. Output, Symmetry, Flatness, Timer Error

Using Protea RBA-3 Analyzer or _____

- Beam analyzer in 20 X 20 field at SSD 80, zero all readouts, set timer for 0.60 minutes.
- Irradiate beam analyzer and record "reading set No. 1."
- Reset timer, zero analyzer, irradiate beam analyzer. Stop and restart beam one time approximately halfway through the irradiation. Record "reading set No. 2."

Ion Chamber No.	1	2	3	4	5
Reading set No. 1	<u>977</u>	<u>975</u>	<u>976</u>	<u>967</u>	<u>902</u>
Reading set No. 2	<u>979</u>	<u>973</u>	<u>976</u>	<u>968</u>	<u>895</u>

4. Timer Linearity and Constancy

Set treatment timer to the following values and record backup timer readings:

Treatment Timer:	0.50 min.	1.00 min	3.00 min.
Backup Timer:	<u>0.52 min.</u>	<u>1.02 min</u>	<u>3.02 min.</u>

5. Support Systems (if No, record comment)

- | | | | | |
|---|-----|-------------------------------------|----|--------------------------|
| a. Door interlock functions properly | YES | <input checked="" type="checkbox"/> | NO | <input type="checkbox"/> |
| b. Beam status lights function properly | YES | <input checked="" type="checkbox"/> | NO | <input type="checkbox"/> |
| c. Viewing system functions properly | YES | <input checked="" type="checkbox"/> | NO | <input type="checkbox"/> |
| d. Treatment room doors function properly | YES | <input checked="" type="checkbox"/> | NO | <input type="checkbox"/> |
| e. Off-shield interlock prevents "beam - on" unless beam is directed to floor | YES | <input checked="" type="checkbox"/> | NO | <input type="checkbox"/> |

Comment: _____

Donald Melgarden R.T. 9.27.90
Signature Date

6. Calculations

- a. Beam analyzer calibration factor 1.529
- b. Expected output for 20 X 20 field at SSD 80 95.4
- c. Calculate output and timer error.

Output = 94.97 rad Timer error = -0.0077 min

- d. Output agrees with expected value to -0.6 %.

Physicist Agnes K. Vank

Date 11/21/91

Comment: _____

$$\frac{0.902}{0.895} = \frac{1 + \Delta t}{1 + 2\Delta t}$$

$$0.902 + 1.804 \Delta t = 0.895 + 0.895 \Delta t$$

$$0.909 \Delta t = -0.007$$

$$\Delta t = \underline{\underline{-0.0077}}$$

AECL THERATRON 780 #253 - MACHINE CHECK
Cobalt 60 Source NPI-20-6000W #T-1017
6890 Ci as of 11/14/89

1. Distance Indicators

- a. Lateral lasers are concentric to + mm.
- b. Set table to 80 SSD using front pointer, lasers reads 80 cm.
- c. Set table to 80 SSD using front pointer, ODF reads 80 cm.

2. Radiation vs. Light Field Coincidence

- a. Ready pack film at SFD 80, set collimator to 10 X 10 cm.²
- b. Film and cover delivered to Physics.
- c. Scribe marks measure 10 X 10 cm.²
- d. Radiation and light coincidence to 1.2 mm.

3. Output, Symmetry, Flatness, Timer Error

Using Protea RBA-3 Analyzer or _____

- a. Beam analyzer in 20 X 20 field at SSD 80, zero all readouts, set timer for 0.60 minutes.
- b. Irradiate beam analyzer and record "reading set No. 1."
- c. Reset timer, zero analyzer, irradiate beam analyzer. Stop and restart beam one time approximately halfway through the irradiation. Record "reading set No. 2."

Ion Chamber No.	1	2	3	4	5
Reading set No. 1	<u>981</u>	<u>974</u>	<u>974</u>	<u>975</u>	<u>994</u>
Reading set No. 2	<u>980</u>	<u>972</u>	<u>973</u>	<u>970</u>	<u>993</u>

4. Timer Linearity and Constancy

Set treatment timer to the following values and record backup timer readings:

Treatment Timer:	0.50 min.	1.00 min	3.00 min.
Backup Timer:	<u>.52 min.</u>	<u>1.02 min</u>	<u>3.01 min.</u>

5. Support Systems (if No, record comment)

- | | | | | |
|---|-----|-------------------------------------|----|-------|
| a. Door interlock functions properly | YES | <input checked="" type="checkbox"/> | NO | _____ |
| b. Beam status lights function properly | YES | <input checked="" type="checkbox"/> | NO | _____ |
| c. Viewing system functions properly | YES | <input checked="" type="checkbox"/> | NO | _____ |
| d. Treatment room doors function properly | YES | <input checked="" type="checkbox"/> | NO | _____ |
| e. Off-shield interlock prevents "beam on" unless beam is directed to floor | YES | <input checked="" type="checkbox"/> | NO | _____ |

Comment: _____

Donald Melpolder 10.4.90
 Signature Date
 R.T.T.

AECL THERATRON 780 #253 - MACHINE CHECK
Cobalt 60 Source NPI-20-6000W #T-1017
6390 Ci as of 11/14/89

1. Distance Indicators

- a. Lateral lasers are concentric to 1.1 mm mm.
- b. Set table to 80 SSD using front pointer, lasers reads 80 cm.
- c. Set table to 80 SSD using front pointer, ODF reads 80 cm.

2. Radiation vs. Light Field Coincidence

- a. Ready pack film at SFD 80, set collimator to 20 X 20 cm.²
- b. Film and cover delivered to Physics.
- c. Scribe marks measure X cm.²
- d. Radiation and light coincidence to mm.

3. Output, Symmetry, Flatness, Timer Error

Using Protea RBA-3 Analyzer or

- a. Beam analyzer in 20 X 20 field at SSD 80, zero all readouts, set timer for 60 minutes.
- b. Irradiate beam analyzer and record "reading set No. 1."
- c. Reset timer, zero analyzer, irradiate beam analyzer. Stop and restart beam one time approximately halfway through the irradiation. Record "reading set No. 2."

Ion Chamber No.					
Reading set No. 1	<u>.978</u>	<u>.968</u>	<u>.966</u>	<u>.978</u>	<u>.899</u>
Reading set No. 2	<u>.976</u>	<u>.964</u>	<u>.971</u>	<u>.975</u>	<u>.890</u>

4. Timer Linearity and Constancy

Set treatment timer to the following values and record backup timer readings:

Treatment Timer:	0.50 min.	1.00 min	3.00 min.
Backup Timer:	<u>.52 min.</u>	<u>1.02 min</u>	<u>3.01 min.</u>

5. Support Systems (if No, record comment)

- a. Door interlock functions properly YES ☒ NO
- b. Beam status lights function properly YES ☒ NO
- c. Viewing system functions properly YES ☒ NO
- d. Treatment room doors function properly YES ☒ NO
- e. Off-shield interlock prevents "beam - on" unless beam is directed to floor YES ☒ NO

Comment: Field size on indicator is shorted out

Sagittal laser is adjusted

Ronald E. Melpolder
Signature

11/2/90
Date

6. Calculations

- a. Beam analyzer calibration factor 1.65 34
- b. Expected output for 20 X 20 field at SSD 80 92.57
- c. Calculate output and timer error.

Output = 92.57 rad Timer error = -0.0099 min

- d. Output agrees with expected value to +0.1%

Physicist Hyman Glick

Date 11/29/80

Comment: _____

$$\frac{0.899}{0.890} = \frac{1+B}{1+2B}$$

$$0.899 + 1.7980B = 0.890 + 0.890B$$

$$0.9080B = -0.009$$

$$B = \underline{\underline{-0.0099}}$$