

LAKE FOREST HOSPITAL



660 North Westmoreland Road • Lake Forest, Illinois 60045 • 312 234-5600

R.M. GARCES, M.D.
V.T. RAGHAVAN, M.D.

RADIATION ONCOLOGY

C.L. SILVERMAN, M.D.
S.G. PRASAD, Ph.D.

May 7, 1985

W. J. Adam, Ph.D.
Materials Licensing Section
U. S. Nuclear Regulatory Commission
Region III
799 Roosevelt Road
Glen Ellyn, IL. 60137

Ref: License # 12-02883-05
Control # 18749

Dear Mr. Adam:

We are glad to resubmit the survey report of our AECL Elderado-8, Co-60 teletherapy unit after its relocation to the basement as required by your letter dated April 4, 1985.

Please feel free to contact us if you need additional information.

Yours sincerely,

Rajesh P. Ruparel
for S. Guru Prasad, Ph.D.
Radiological Physics

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REG3 LIC30
12-02883-05 PDR

MAY 10 1985

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RADIATION SURVEY REPORT

(Survey done following relocation of our Co-60 Elderado teletherapy unit to the basement) .

1. Institution Possessing and using the source. :Lake Forest Hospital

Address :660 North Westmoreland
Lake Forest, IL. 60045

Licence number :12-02883-05
2. Name of the person conducting the survey. :S. Guru Prasad, Ph.D.
Radiological Physicist
and Rajesh P. Ruparel

Address :Lake Forest Hospital
660 North Westmoreland
Lake Forest, IL. 60045
3. Reason for the survey :Relocation of our Co-60 Elderado
teletherapy unit to the basement.
4. Date of the survey :Feb 1st. 1985
5. Radiation detection instrument used :Victoreen 470A
Serial # 2601

Date of Calibration :2/20/84

Method of Calibration :See attached calibration certificate.
6. Teletherapy Unit

Name of the manufacturer :Atomic Energy of Canada Ltd.

Model and serial # :Elderado 8, S/N:36

Source:

Name of the manufacturer Neutron Products Incorporated

Catalog # and Serial #

: 4800 W, S/N T-563

Number of curies the source
contained at installation time

: 4220 date 7/9/82

7. Intensity of the primary beam

: Measured on Feb 1st. 1985.
See Appendix A.

8. Maximum and average radiation levels

: Measured at one meter from the source
with source in the "Off" position.
See Appendix B.

9. Limits of beam orientation

: Primary beam can be aimed only in these
directions:
: 0° vertical, towards the floor.
: 90° horizontal, towards the north wall.
: 180° vertical, towards the ceiling.
: 270° horizontal, towards the south wall.

10. Maximum radiation levels. Were measured in each adjacent area to the teletherapy unit room with source in the "On" position.
See Appendix C.

For all the tests numbers 11-14, given below a gamma ray detector (room area monitor) present inside the teletherapy unit room was used to detect the presence of radiation in the room.

11. Beam "On -off" Test When the beam switch is turned to the "On" position, the gamma ray detector lamp inside the teletherapy room starts glowing indicating the beam is "On". When the beam switch comes to the "Off" position, the gamma ray detector lamp stops glowing indicating the beam is "Off". This test shows the beam "On-Off" mechanism function properly.
12. Door interlock test. The electrical interlock on the entrance door was tested by
- Keeping the door open, and turning the beam switch to the 'on' position the beam does not go "On", and also the gamma ray detector lamp inside the room does not glow.
 - With the door closed and the beam in the "On" position the gamma ray detector lamp glows - the door is opened and the gamma ray detector lamp stops glowing. This test shows the door - interlock functions properly.
13. On- Off indicators: There are two "On-Off" indicators. One on the console and the other above the entrance door. They were tested as follows:
- When the beam is in "On" position - the gamma ray detector lamp glows and the indicators show "red".
 - When the beam is in the "Off" position- the gamma ray detector lamp does not glow - the indicators show "green". This test shows the "On-Off" indicators function properly.

14. Timing device: The timing device was tested against a calibrated electronic stop watch as follows:

- a. With beam - Timer set for 120 seconds, the stop watch and the "Beam On" switch is turned 'On' simultaneously - the gamma ray detector lamp starts glowing.
- b. At the end off 120 seconds, on hearing the "Click" sound, (Indicating the beam is turned "Off") the stop-watch is stopped- the gamma ray detector lamp stops glowing. The results are as follows:

Beam - On timer set	: 120 seconds
Stop-watch simultaneously run indicates the time (including human response time)	: 120.6 seconds
Variation in the timing device	: 0.6 seconds
% Variation	: 0.5 %



CERTIFICATE OF INSTRUMENT CALIBRATION

No. 17701

HEALTH PHYSICS ASSOCIATES LTD. CONSULTANTS IN RADIATION SAFETY

3304 COMMERCIAL AVENUE / NORTHBROOK, IL 60062 / PHONES: 312/564-3330

for

Lake Forest Hospital
660 Westmoreland
Lake Forest, IL 60045
Attn: Radiation Oncology
Dr. Prasad

P.O. #

55909

INSTRUMENT DATA

Type VictoreenModel 470ASerial No. 2601

CALIBRATION DATA

Scale	Radiation Level	Meter Reading	Radiation Level	Meter Reading
1000	800	790	200	200
300	250	247	50	50
100	80	77	20	20
30	25	24	5	4.8
10	8	7.4	2	2
3	2.5	2.4	0.5	0.5
10R/h	4R/h	4R/h	2R/h	2R/h
3R/h	2.5R/h	2.5R/h	0.5R/h	0.5R/h

ALL READINGS, UNLESS OTHERWISE INDICATED, ARE IN mR/h

CALIBRATION

Cs 137

Source

25 °C

Temperature

DRIFT CHECK

Time 1 hrs Temp 25 °CBegin 2 mR/h End 2 mR/h
Meter reading with source

CHECK SOURCE

Meter Reading

~ 0.9 mR/h

MAINTENANCE DATA

Batteries Replaced

None

Components Replaced

None

Services Performed

Battery Check	<input checked="" type="checkbox"/>	Other	None
Clean Battery Contacts	<input checked="" type="checkbox"/>		
Routine Preventative Maintenance	<input checked="" type="checkbox"/>		
Cleaned Switch Contacts	<input checked="" type="checkbox"/>		

We certify that this instrument was calibrated on date shown, and it meets presently accepted standards for this type of equipment.

35

In accordance with NRC regulation 10 CFR ~~20.1301~~, this instrument should be recalibrated before 2/20/85CHECKED BY Steve Knight DATE 2/20/84

Appendix "A"

The Co-60 Elderado 8, Teletherapy unit was calibrated for output, after its relocation to the basement.

The output was measured for 10 X 10 cm² field size, 80cm SSD, in a polystyrene phantom at a depth of 5 cm.

Measuring devices used	: a. PTW Frieburg ionization chamber, N 2333-A265, 70 KV—Co-60 b. Keithley 3561 ⁴ digital dosimeter Serial #17941
Instrument Correction Factor	: 56.05 x 10 ⁸ R/C.
Back Scatter Factor	: 1.035
F factor	: 0.95
Attenuation factor	: 0.99
Temp. press correction factor	: 1.0074
Percentage depth dose (5 cm depth)	: 78.5 %

Time	Instrument Reading(10 ⁻⁸ C)	Average
1.0 min+ t*	1.2170, 1.2178, 1.2176	1.2175
1.0 min+ 3t*	1.1796, 1.1767, 1.1820	1.1795

*: Shutter time

$$\text{Shutter time} = \frac{1.1795 - 1.2175}{5(1.2175) - 1.1795} = 0.0077 \text{ min}$$

$$\begin{aligned} \text{Output} &= \frac{1.2175 \times 10^{-8} \text{ C} \times 56.05 \times 10^8 \text{ R/C} \times 1.035 \times 0.95 \times 0.99 \times 1.0074}{(1-0.0077) \times 0.785} \\ &= 85.91 \text{ CGy/min} \end{aligned}$$

APPENDIX "B"

TELETHERAPY HEAD SURVEY (Following relocation to the measurement)
 (Source in "OFF" position.
 Measurements taken one meter
 from source)

Top View - Showing orientation
 of Views A through D

Position No.	Radiation Level (mR/hr)
View A 1	2.0
2	4.0 0.6
3	3.3
4	0.55

View B 5	1.6
6	1.4
7	0.4
8	0.4

View C 9	1.0
10	1.0

View D 11	0.1
12	0.1
13	0.8
14	0.6

Average value 1.0 mR/hr

Maximum value 3.3 mR/hr

Instrument used VI 470A

Curies 4220

Date 7/9/82

Manufacturer's
 name & model #
 of teletherapy
 unit. AECL

Eldorado & Teletherapy Unit
(S/N 36)
Rejesh P. Pujari
2/1/85

Rear

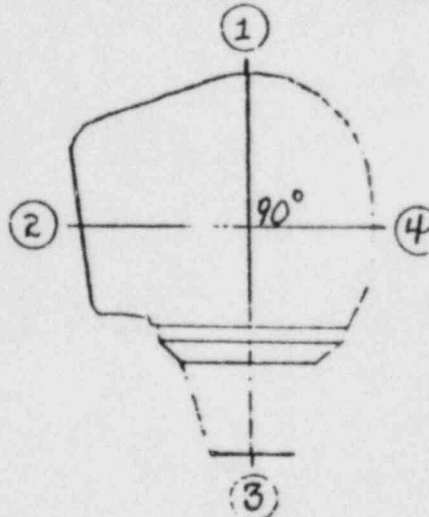
A (left side) →

B (left-front) →

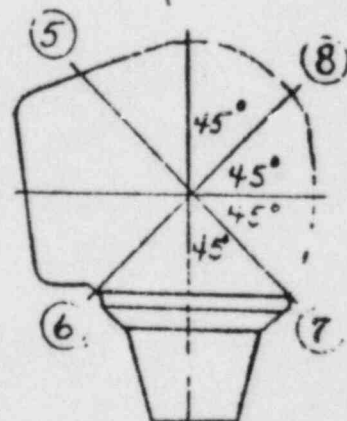
← D (right-front)

C (front)

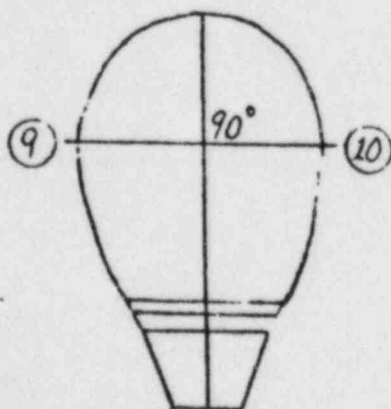
View A - Vertical from left side



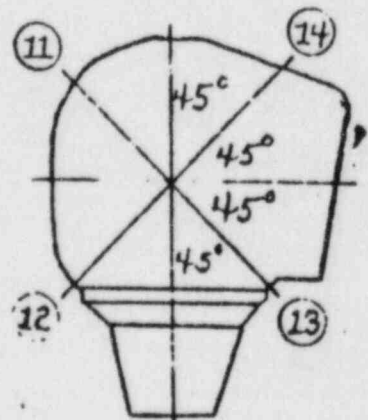
View B - Vertical from left-front

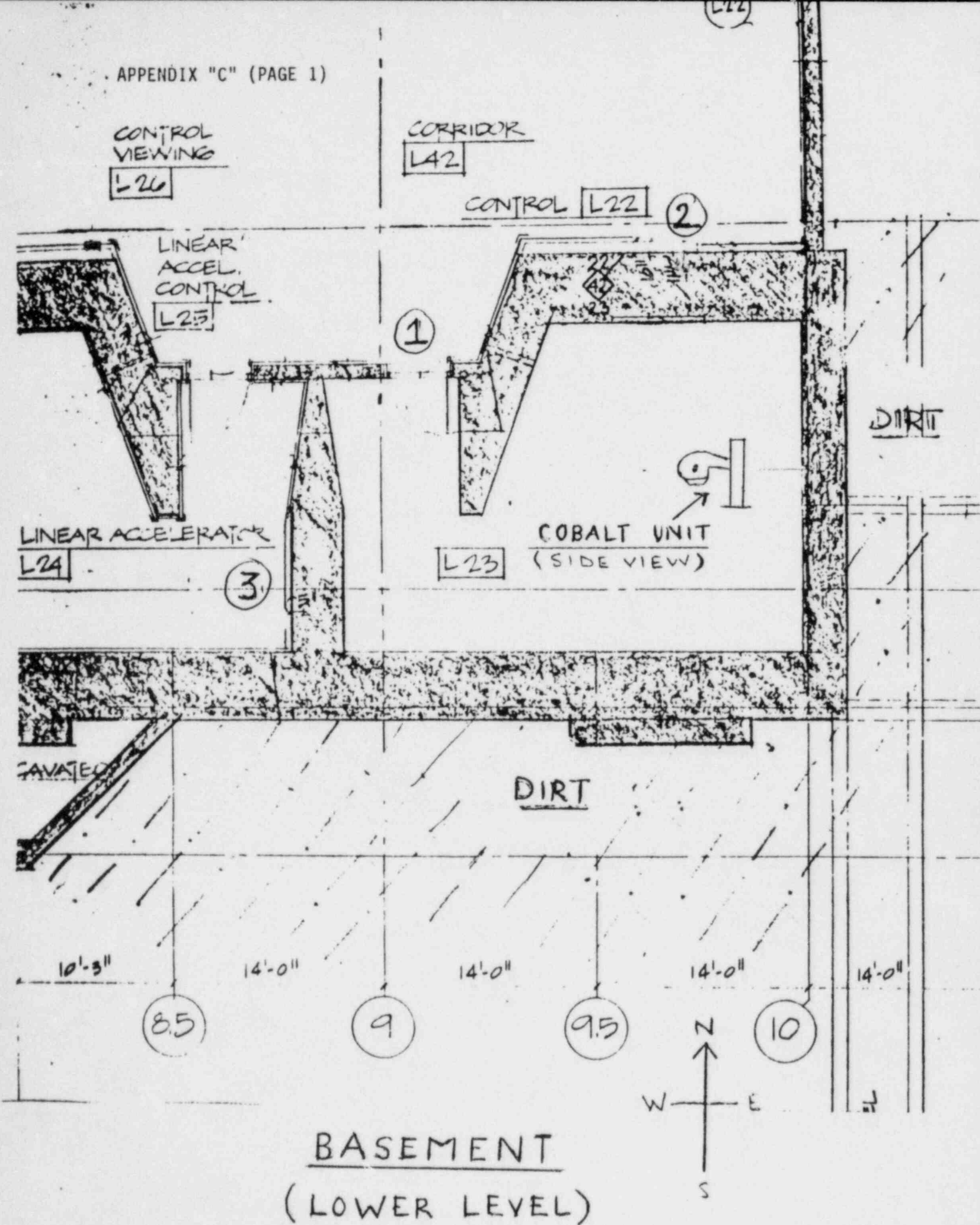


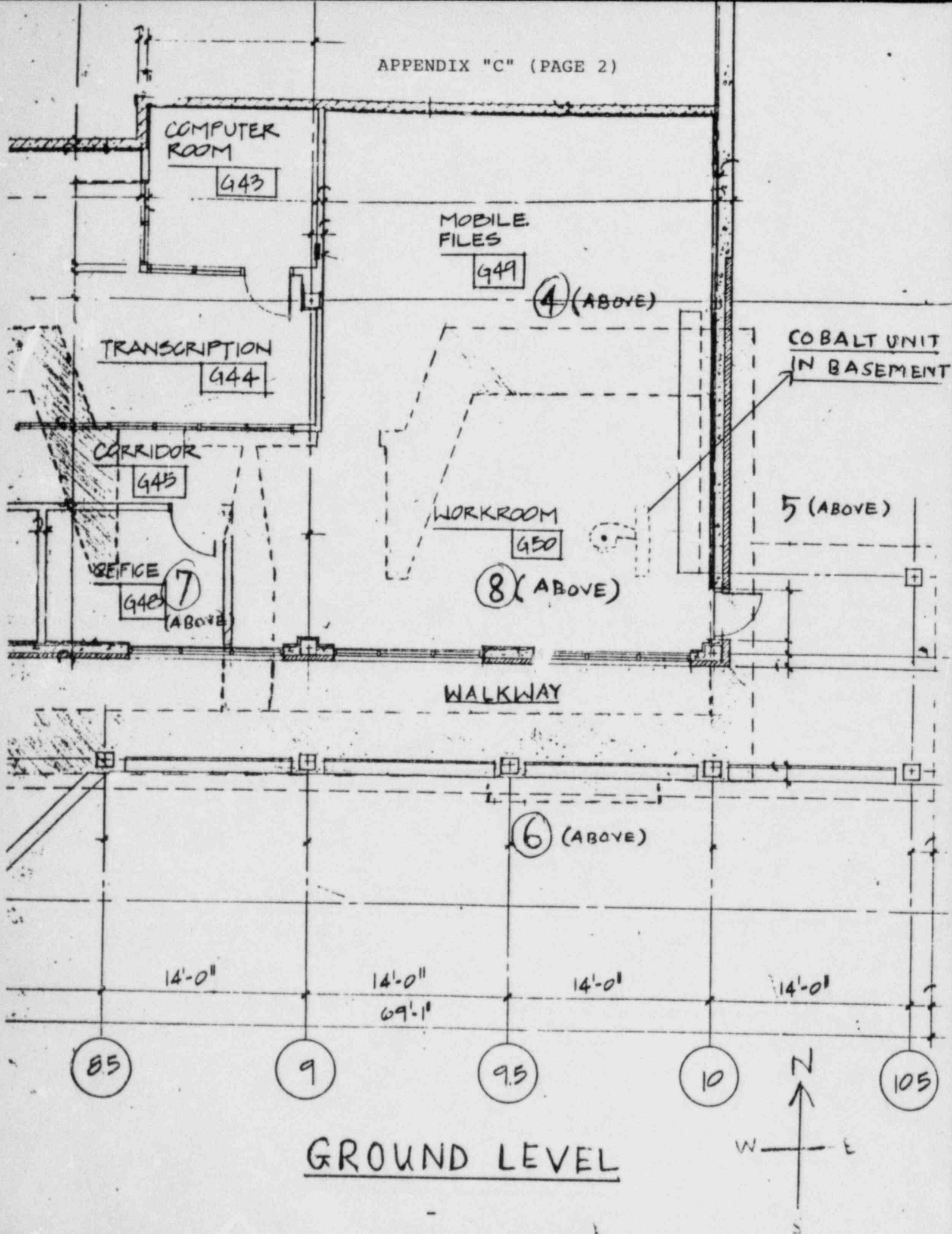
View C - Vertical from front



View D - Vertical from right-front







Appendix "C" (page 3)

Areas surveyed with beam "On", and phantom in primary beam.

Phantom : Polystyrene, 25 x 25 x 12 cm³

Source to phantom surface distance : 80 cm.

Field size used : Maximum i.e. 32 x 32 cm²

<u>Location</u>	<u>Level</u>	<u>Beam Orientation</u>	<u>Survey meter readings(mR/hr)</u>
1	Basement	90° horizontal, towards north wall	< 0.2
2	Basement	90° horizontal, towards north wall	< 0.2
3	Basement	0° vertical, towards the floor	< 0.2
4.	Ground	Inclined 135° to the vertical, towards north wall	< 0.2
5	Ground	180° vertical, towards the ceiling	< 0.2
6	Ground	Inclined 225° to the vertical, towards the south wall	< 0.2
7	Ground	180° vertical, towards the ceiling	< 0.2
8	Ground	180° vertical, towards the ceiling	< 0.2