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LUTHERAN MEDICAL CENTER

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U.S. DEPARTMENT OF ENERGY
REGULATORY COMMISSION

March 19, 1980

Materials Branch
Division of Materials and Fuel Cycle Facility Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Gentlemen:

Please find enclosed the survey report concerning our new
cobalt teletherapy installation.

Sincerely,

Theodore J. Castele, M.D.
Theodore J. Castele, M.D.
Director of Radiology

TJC:sh

Enclosure

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SURVEY REPORT OF COBALT TELETHERAPY UNIT

Institution

Lutheran Medical Center
2609 Franklin Boulevard
Cleveland, Ohio 44113.

NRC License No.

34-01869-02

Teletherapy Unit

AECL G2200P Theratron 780 with beam stopper.

Teletherapy Source

AECL Type C-151 Co60C, certified as containing 4614 curies of Cobalt-60 on March 20, 1979.

Date of Installation

Unit initially installed on August 30, 1979. Use of unit permitted only after February 20, 1980 following installation of room door according to design specifications.

Surveyor

P.S. Rao, PhD
Department of Radiology
University Hospitals of Cleveland
Cleveland, Ohio 44106.

Dates of Survey

February 12, 1980, February 21, 1980 and February 24, 1980.

Survey Instruments

1. Victoreen 444 ion chamber survey meter, last calibrated by P.S. Rao (see above) according to the procedure described and approved in Nrc License No. 34-05469-01.
2. Victoreen 555 electrometer with Victoreen 555-100HA chamber, last calibrated by Regional Calibration Laboratory, Victoreen Company, Cleveland, Ohio, on May 30, 1978.

Source Output

The following are representative of the complete set of exposure rates measured in air on the beam axis for a source-to-chamber distance of 80 cm:

Field size (cm x cm)	Output (R/min)
5 x 5	129.4
10 x 10	133.8
20 x 20	139.6
35 x 35	140.4

Head Survey

Radiation levels were measured at 14 points that were one meter from the teletherapy source in the "off" position. The average level was 0.2 mR/hr and the maximum was 0.4 mR/hr. Details are presented in the accompanying diagram.

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Beam Orientation Limits

With the beam directed at the integral beam absorber, no restrictions existed on the orientation of the beam.

With the beam directed away from the integral beam absorber, electrical beam stops permitted the beam to be turned on only if it was within a 90° arc between vertically down and horizontally towards the outer (northwest) wall of the building. See accompanying room plans.

The above restrictions were tested by rotating the sourcehead-absorber arm to various positions (gantry angles of 0°, 30°, 60°, 90°, 270° and 315°), swivelling the sourcehead to various directions and attempting to turn the beam on. Results were as described above.

Area Survey

Radiation levels were measured in areas adjacent to the teletherapy room for a variety of beam orientations. Details are shown in the accompanying table. For these measurements, the collimators were opened to the maximum extent (35 cm x 35 cm at 80 cm). The phantom, where used, was of water and of dimensions 25 cm x 25 cm x 22 cm.

With one exception, all measured levels fell within the limit of 2 mR/hr for unrestricted areas. The exception was the area just outside the outer wall, where a maximum of 7.8 mR/hr was measured. This was for a beam orientation in which the beam was directed horizontally at the wall and the beam axis was 175 cm (5' 9") above the ground. For more likely orientations, the radiation levels were within 2 mR/hr.

Door Interlock

The electrical interlock on the door was found to operate properly. When the door was open, the beam could not be turned on. After the door was shut, the beam was turned on. When the door was opened again, the beam was shut off immediately. To turn it on again, the timer switch had to be turned off, the reset button depressed and the timer switch turned on again.

On-Off Indicators

All on-off indicators were found to operate properly. They were tested during the calibration phase of the survey, when the electrometer and ion chamber served as an independent check on the presence of the radiation beam.

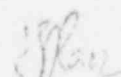
When the beam was turned on, lights glowed on the control console and over the door. Using the TV monitor, one could observe a light on the sourcehead, as well as a portion of the source drawer which protruded from the sourcehead. An area radiation monitor inside the teletherapy room had been set so that a light over the control console flashed on and off whenever the beam was on. The monitor would sound an alarm only if the door were open.

Timer

The timer was checked against an independent stopwatch and was found to operate properly when set for both integral and fractional minutes.

Viewing System

A TV camera and monitor were used to view the patient during treatments.



P.S. Rao, PhD
Radiologic Physicist

TELETHERAPY HEAD SURVEY
(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	0.1
2	0.2
3	0.3
4	0.3

View B 5	0.1
6	0.1
7	0.1
8	0.3

View C 9	0.2
10	0.3

View D 11	0.1
12	0.1
13	0.4
14	0.2

Average value 0.2
Maximum value 0.4

Instrument used Victoreen 444

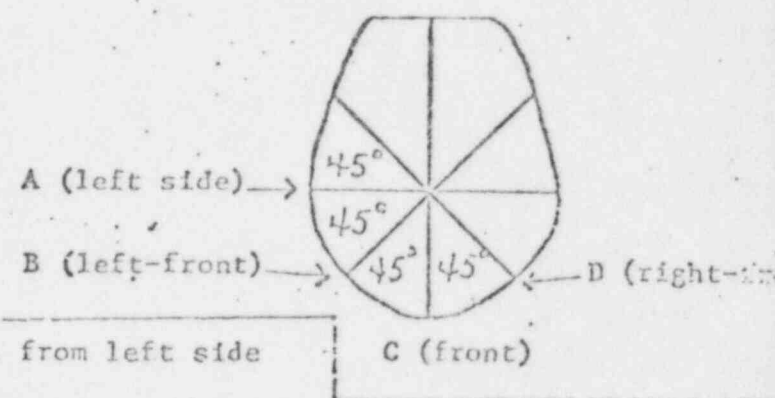
RHM 98.5 Rm
Curies 4614

Date on Mar 20, 1979
Survey on

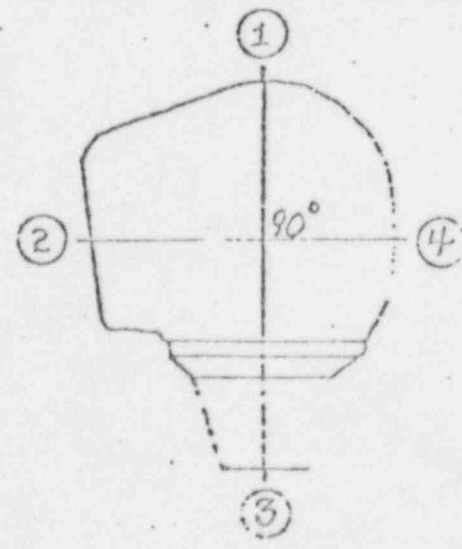
Manufacturer's Feb 12, 1980
name & model #
of teletherapy
unit

AECL Theratron 780

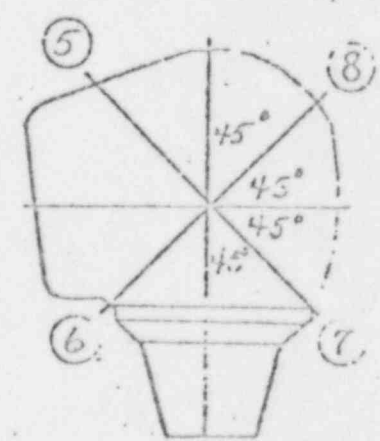
Rear



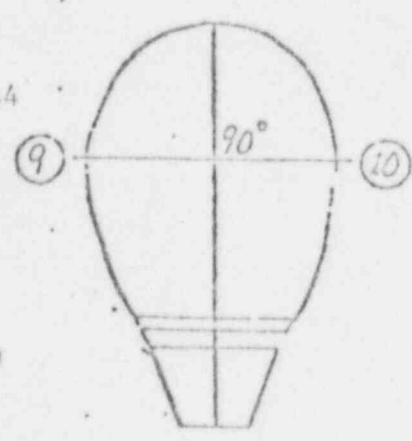
View A - Vertical from left side



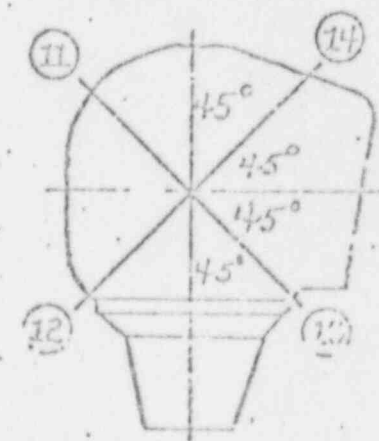
View B - Vertical from left-front

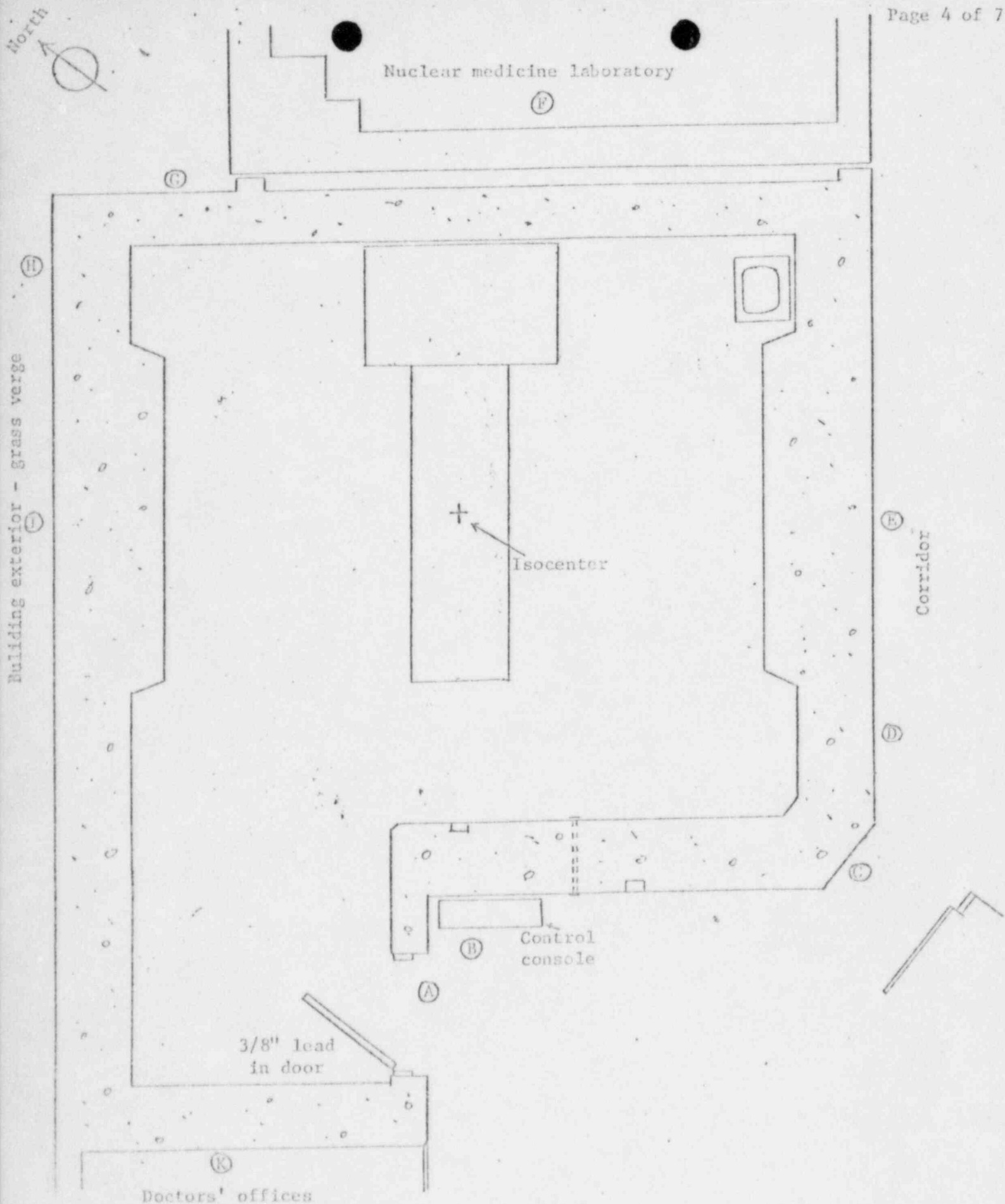


View C - Vertical from front



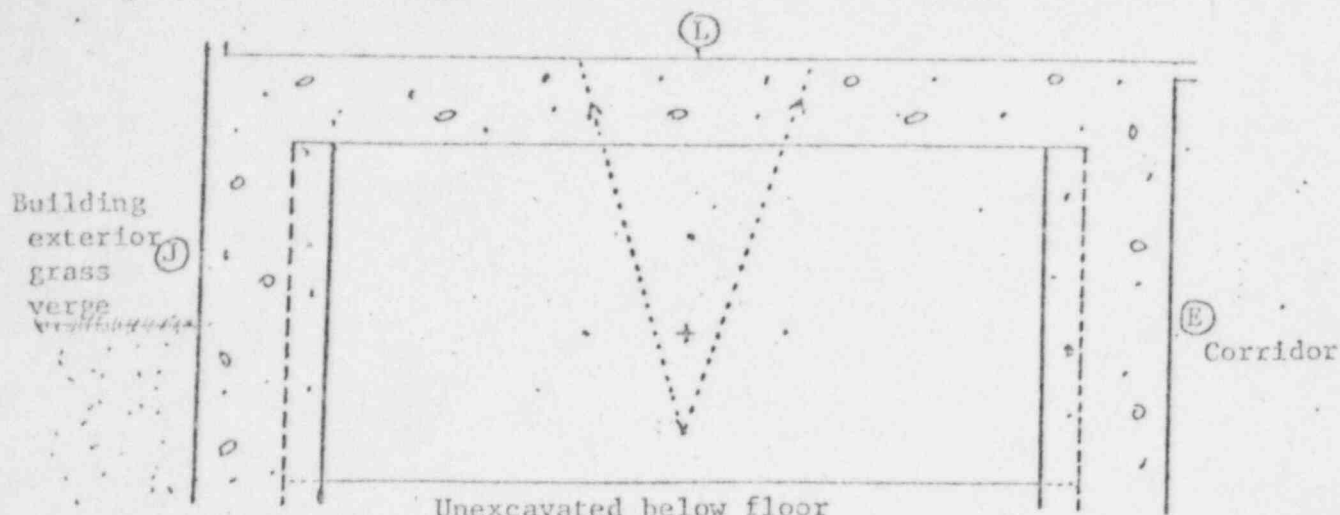
View D - Vertical from right-front



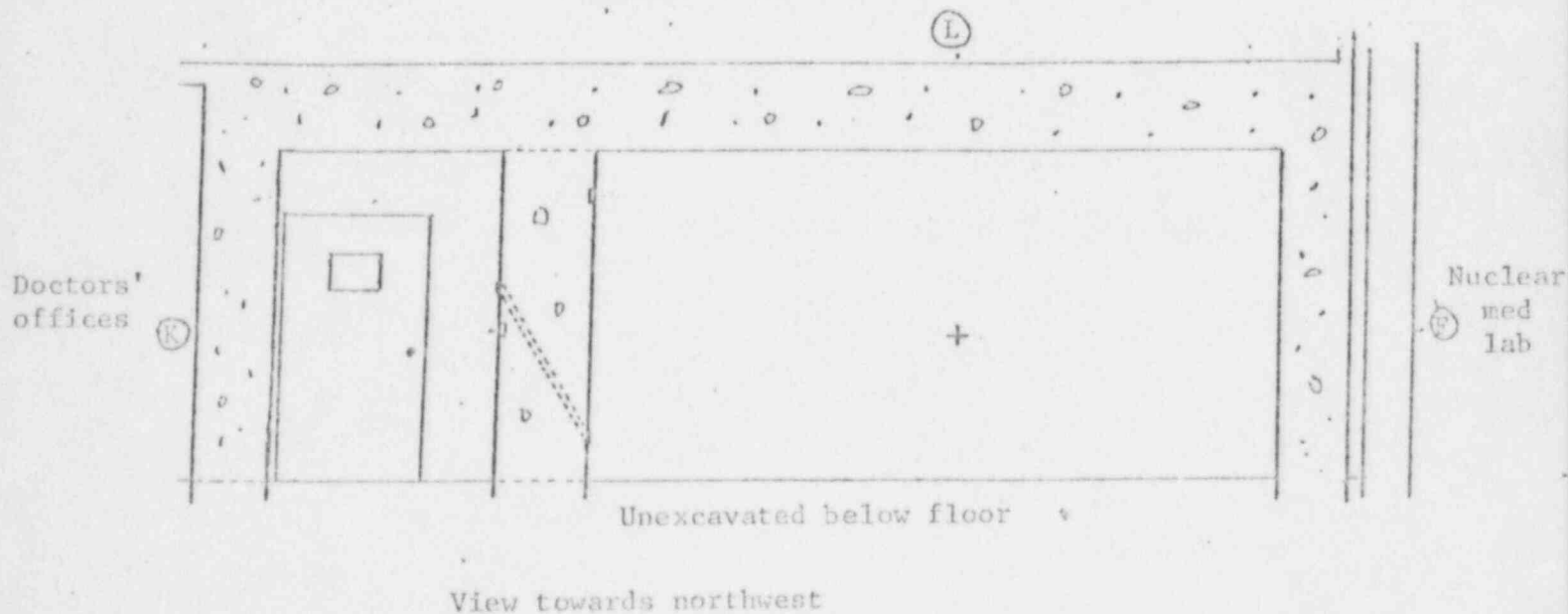


Plan of cobalt teletherapy room equipped with AECL Theratron 780 in basement of Lutheran Medical Center, Cleveland, Ohio.

First floor - conference room and office



First floor - conference room and office



Elevations of cobalt teletherapy room equipped with AECL Theratron 780 in basement of Lutheran Medical Center, Cleveland, Ohio.

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Radiation levels (above background) near cobalt teletherapy room

Location	Orientation of beam	Beam absorber	Phantom	Primary-P or Scatter-S (Angle of scatter)	SSD (cm)	Cantry angle	Swivel angle	mR/hr
Door A	Horizontal toward outer (NW) wall	No	No	S (90° twice)	165	315°	135°	0.1
	"	No	No	S (90° twice)	260	30°	60°	0.2
	"	Yes	Yes	S (45°)	75	90°	0°	<0.1
	Nearly horizontal, slightly downwards	No	No	S (90° twice)	180	315°	105°	0.2
Control console B	Horizontal toward outer (NW) wall	No	No	S (135°)	165	315°	135°	<0.1
	"	No	No	S (135°)	260	30°	60°	<0.1
	Nearly horizontal, slightly downwards	No	No	S (135°)	180	315°	105°	<0.1
	Vertical down	Yes	Yes	S (90°)	75	0°	0°	<0.1
Corridor C, D	Vertical down	Yes	Yes	S (90°)	75	0°	0°	<0.1
	Horizontal toward corridor	Yes	Yes	S (45°)	75	270°	0°	<0.1
	Vertical down	No	Yes	S (90°)	100	60°	300°	<0.1
Corridor E	Toward corridor and downwards	Yes	Yes	S (30°)	75	300°	0°	<0.1
	"	Yes	Yes	S (45°)	75	315°	0°	<0.1

