DEPARTMENT OF THE ARMY
FITZSIMONS ARMY MEDICAL CENTER
AURORA, COLORADO 80045

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U.S. NUCLEAR REG. COMMISSION
MAIL SECTION

HSF-X

16 January 1981

SUBJECT: Source Replacement in Co-60 Teletherapy Unit

THRU: Commander
US Army Health Services Command
ATTN: HSPS-P
Fort Sam Houston, TX 78234

20 Jan 81

HSDA (DASG-PSP-P)
Washington, D.C. 20310

26 Jan 81

ROBERT F. WARGOWSKI
Colonel, MSC
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TO: US Nuclear Regulatory Commission
Materials Branch
Division of Materials and Fuel Cycle Facilty Licensing
Washington, D.C. 20555

1. References:

a. NRC License number 05-00046-15, Amendment number 07.

b. NUREG-0339 (Draft).

c. N.C.R.P. Report 33.

2. In accordance with paragraph 18, reference 1a, and the guidance furnished by reference 1b, the following information is submitted.

a. The licensee is: Department of the Army, Fitzsimons Army Medical Center, Aurora, Colorado, 80045.

b. The survey was conducted by MAJ Michael D. Williams, PhD, Medical Physicist, Department of Radiology, Fitzsimons Army Medical Center, Aurora, Colorado, 80045.

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c. The teletherapy unit and the Co-60 source (Type C-146) were manufactured by Atomic Energy of Canada Limited (AECL). The unit is a Theratron 80.

d. The new source was installed 21 December 1980. A preliminary head leakage survey and a full calibration were conducted on 21 December 1980. The final head leakage survey and complete facility survey were performed 13-15 January 1981.

e. The radiation output was measured by a Victoreen Condenser R-Meter Model 570, calibrated 18 November 1979 by the Regional Calibration Laboratory, MD Anderson Hospital and Tumor Institute, Houston, TX. The instrument was calibrated at Co-60 energies by comparison with a transfer-quality ionization chamber which was calibrated at the National Bureau of Standards (NBS). Head leakage and facility survey measurements were made with a Victoreen Model 440 instrument, calibrated 6 January 1981 by Sacramento Army Depot with the calibration traceable to NBS. The calibration was accomplished at Cs-137 energy according to the manufacturer's recommendations.

f. According to information furnished by AECL, the activity of the source as of the date of installation was 7482 Ci.

g. The exposure rate for a 10cm x 10cm field at 80cm SSD was measured to be 201.8R/min. 7749 RHM

h. In accordance with reference 1c, 26 points were used to measure the head leakage at one meter from the source. The maximum reading was 4.0R/hr directly in front of the head along the axis of the source drawer and the mean radiation level was 1.9mR/hr.

i. Switches restrict the operation of the source drawer so that the source can move to the "on" position only when the primary beam is directed toward the floor, the north wall (a primary barrier), or the unit's counterbalance beam absorber. The source drawer will not operate if the source head is pointed at an angle greater than 2^{o} south or 83^{o} north of an imaginary vertical line between the source and the treatment room floor, unless the beam is directed at the counterbalance. The source drawer will not expose the source in a rotational mode if the source head is pointed at an angle greater than 5^{o} from an imaginary line between the source and the center of the counterbalance beamstop, restricting the primary beam to the beamstop.

j. A survey was performed to determine radiation levels to areas surrounding the treatment room with the source in two configurations. The first was in the normal AP/PA treatment configuration with the primary beam directed vertically downward, the collimators opened to their fullest extent, and a Rando phantom in

position on the treatment couch. The gantry was situated so that the integral beam absorber was in line with the beam below the table. The second configuration was set to simulate the treatment of a patient off the treatment couch toward the north wall. The gantry was angled 15° and the head swiveled 55°, resulting in the primary beam being directed downward at an angle of 40° from vertical. This was considered the treatment configuration which would result in the maximum scatter radiation to adjacent areas. The Rando phantom was positioned in the primary beam and the collimators were open to the maximum extent. The following radiation levels were measured.

Location	Normal Treatment Configuration	Maximum Scatter Configuration
Control Panel	0.5 mR/hr	0.0 mR/hr
Treatment Room Door	1.5	0.0
Treatment Room Window	1.0	0.0
Storage Room (Above)	0.0	0.1
Storage Room (South)	1.0	0.0
Generator Room (South)	0.0	0.0
Examination Room (East)	0.0	0.0
Crawl Space (North)	0.0	0.1
Crawl Space (West)	0.2	0.1

k. Tests were conducted of the treatment room door interlock system, the source "on-off" position indicators at all locations, and the beam orientation limiting devices used to restrict the angulation of the beam. All were found to be functioning properly. Also, the teletherapy treatment timing device was measured at several different settings and was found to operate properly and accurately.

3. In summary, the results of these measurements indicate that this teletherapy unit and treatment facility comply with the provisions of sections 20.101 and 20.105(b) of Title 10, Part 20, Code of Federal Regulations.

FOR THE COMMANDER

GEORGE H. TOUCHARD, JR
MAJOR, MSC
Adjutant General