

RADIATION PROTECTION SERVICE

SAFETY ADVISORY SERVICES



UNIVERSITY OF LEEDS

RPA GENERIC RISK ASSESSMENT NO 1: HAZARD IDENTIFICATION & RISK ASSESSMENT FOR THE USE OF A SCANCO MEDICAL MODEL 80/81 MICRO-CT SCANNER

DESCRIPTION

- 1) The Model 80/81 MicroCT Scanner is a fully enclosed bench top x-ray enclosure of approximate dimensions 1500 mm (l) x 750 mm (h) x 500 mm (d). Access to the enclosure is via a door that is fully interlocked to the x-ray shutter. The system is under computer control; it is only possible to operate the x-ray tube via the computer console / software system, which monitors and is linked to the engineered safety devices.
- 2) The x-ray tube operates at 70 kV, 0.18 mA and has 0.5 mm of aluminium filtration added; the maximum output is approximately 160 mSv h⁻¹ at 1 m from the window (calculations made using data supplied in British Standards BS 4094 Part 2: 1971).

<u>Version</u>	<u>Author</u>	<u>Checked</u>	<u>Approved</u>	<u>Date of issue</u>
1.1	IKH	-	IKH	16 th April 2005

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HAZARD & RISK ASSESSMENT

Condition	Exposure pathway	Radiation exposure	Level of risk	Risk reduction measures
Exposure to unshielded x-radiation	External irradiation			
	(1) Damage to, or slippage of, the radiation shielding allowing the leakage of radiation from the cabinet.	Penetrating x-rays; dose rate 160 mSv h^{-1} . If a person were exposed by standing adjacent to a leakage point, their exposure would exceed the University dose constraint (annual dose limit) of 1 mSv in ~ 22 seconds.	Health – Low The integral shielding is designed to a high standard and slippage or damage would not occur under normal operational conditions. Collateral – Low Dose rate exceeds internal guidelines and national dose rate limit for the designation of Controlled Areas; potential for legislative infraction. Critical failure of the equipment may be reportable to the Health and Safety Executive under RIDDOR.	The equipment is manufactured to a high standard and is not expected to leak radiation. Failure of the x-ray tube or any of the safety features under normal operational conditions would cause the x-ray beam to terminate (this is not reportable). If the equipment is moved more than 1m in direction the Radiation Protection Adviser must carry out a Critical Examination before the x-ray tube is energised.
	(2) Overriding the door interlocks and gaining access to the x-ray chamber whilst the x-ray tube is generating x-rays	Penetrating x-rays; scatter dose rate $\sim 180 \text{ mSv h}^{-1}$ at 30 cm from the x-ray tube. If a person were standing in front of the cabinet with	Health – Low It is not possible for a user to override the safety features; consequently the risk of exposure through	Users must be trained in the operation of the equipment and must follow appropriate protocols. No one should attempt to

Condition	Exposure pathway	Radiation exposure	Level of risk	Risk reduction measures
	and the shutter is open.	the access door open, their exposure would exceed the University dose constraint (annual dose limit) of 1 mSv in ~20 seconds.	deliberate action of negligence is low.	bypass any of the safety features.
Damage / fire				
	Damage to the equipment by impact or fire.	Penetrating x-rays; dose rate 160 mSv h ⁻¹ . If the equipment was damaged but still operable, and a person was exposed by standing adjacent to a leakage point, their exposure would exceed the University dose constraint (annual dose limit) of 1 mSv in ~22 seconds.	Health - Medium If the equipment were subject to high-energy impact it is possible that the lead shielding might bend or slip. It is unlikely that the equipment would remain operable after sustaining fire damage.	If the equipment has received a significant knock, has been close to a fire, or has been damaged in any other way the user should (1) switch the power off and (2) inform the RPA and the manufacturer to seek advice before using the equipment.
Unauthorised maintenance / servicing				
	Removal of panels giving access to unguarded x-ray beam	Penetrating x-rays; dose rate 160 mSv h ⁻¹ . If a person were exposed by standing adjacent to a leakage point, their exposure would exceed the University dose constraint (annual dose limit) of 1 mSv in ~22 seconds.	Health – High Removal of the cabinet covers could give access to areas where there is a high dose rate. Collateral – Low Dose rate exceeds internal guidelines and national	All repairs and modifications to the equipment must only be carried out by the manufacturer or by a qualified service engineer appointed by the manufacturer. If the equipment is serviced

Condition	Exposure pathway	Radiation exposure	Level of risk	Risk reduction measures
			dose rate limit for the designation of Controlled Areas; potential for legislative infraction.	on site, and servicing requires the removal of the panels or over-riding of the safety features, the service engineer must have sole use of the laboratory. There is a service and maintenance contract for the equipment.