

# RADIATION PROTECTION SERVICE

DEPARTMENT OF WELLBEING, SAFETY & HEALTH



UNIVERSITY OF LEEDS

## RPA GENERIC RISK ASSESSMENT NO 26: HAZARD IDENTIFICATION & RISK ASSESSMENT FOR THE USE OF A TSI ADVANCED AEROSOL NEUTRALIZER, TYPE 3088

### DESCRIPTION

- 1) The TSI type 3088 aerosol neutraliser is a plug in module for the TSI SMPS spectrometer and is only operable when situated in place in the instrument. The x-ray source is contained within a stainless steel chamber with only gas inlet and outlet port access. The x-rays are shielded by the enclosure and there are no accessible x-ray emissions during normal use.
- 2) **Under normal operational conditions, with the safety features working correctly, there is no risk of exposure to radiation.**
- 3) Manufacturer's specifications are that the x-ray tube emits x-rays at an energy <9.5 keV. The output from the tubes is unknown, however, from data supplied in British Standards BS 4094 Part 2: 1971 it can be estimated that radiation dose rates directly in front of an unshielded tube would be several Gy h<sup>-1</sup>.

<u>Version</u>	<u>Author</u>	<u>Date of issue</u>	<u>Date of review</u>	<u>Risk Rating</u>
1.0	Andrew Cowling	6 <sup>th</sup> November 2015	6 <sup>th</sup> November 2018	Low

## HAZARD &amp; RISK ASSESSMENT

Condition	Exposure pathway	Radiation exposure	Level of risk	Risk reduction measures
<b>Exposure to unshielded x-radiation</b>	<b>External irradiation</b>			
	Damage to the x-ray chamber, which acts as a radiation shield, may permit access to x-ray radiation.	Soft x-rays; dose rate several Gy h <sup>-1</sup> .  If a person were exposed by being close to a leakage point, their exposure is likely to exceed the University dose constraint (annual dose limit) of 1 mSv.	<b>Health – Low</b>  The likelihood of damage to the module is low, and would require gross negligence on the part of the operator.  If the equipment were subject to damage and remained operable there is a risk of x-ray leakage.  <b>Collateral – Low</b>  The unshielded dose rate exceeds internal guidelines and national dose rate limit for the designation of Controlled Areas, and there is the potential for legislative infraction. However, the likelihood of such a failure is low.  Critical failure of the equipment may be reportable to the HSE.	The equipment has been subject to a 'Critical Examination' which found no failings with the system or its safety devices.  Failure of the x-ray tube or any of the safety features under normal operational conditions would cause the x-ray module to be inoperable.  If the equipment has received any damage, has been close to a fire, or has been damaged in any other way the user should (1) switch off and isolate the power, then (2) inform the Radiation Safety Coordinator, the Radiation Protection Service and the manufacturer to seek advice before using the equipment.

Condition	Exposure pathway	Radiation exposure	Level of risk	Risk reduction measures
<b><i>Unauthorised maintenance / servicing</i></b>				
	Access to an unguarded x-ray beam.	Soft x-rays; dose rate several Gy h <sup>-1</sup> . High accessible dose rates. National limits on extremity exposures may be exceeded and the University dose constraint would be exceeded.	<b>Health – High</b> Dismantling of x-ray module could give access to areas where there is a high dose rate. <b>Collateral – Medium</b> Dose rate exceeds internal guidelines and national dose rate limit for the designation of Controlled Areas; potential for legislative infraction.	All repairs and modifications to the equipment must only be carried out by the manufacturer or by a qualified service engineer.  If the equipment is serviced on site the service engineer must have sole use of the laboratory.