

UNLV Guideline for Risk Assessment and Control of Radiation Producing Devices

RPD Safety Level	Risk Level	Radiation Levels, Design Features, Use	Control Measures
Non-medical 1	No risk that an individual will receive more than the annual dose limit for a member of the public (100 mrem/y) unless there is tampering with the device. REASON: The beam is enclosed and well shielded. No work is performed inside the enclosure whenever the beam is on. <i>Example: electron microscope.</i>	- Totally enclosed design with shielding and external surfaces that are fixed in place or are interlocked to turn off X-ray production. - No repair/alignment/sample placement/etc. can be made within the enclosure while the beam is on - Radiation levels are less than 50 microR at in 1 hour at 30 cm from the surface of the device under all operating conditions	The device must be: - registered annually with the State of NV - authorized by Radiation Safety prior to operation - surveyed prior to initial operation and re-surveyed prior to operating after any activity with the potential to impact external radiation levels - used under the direction of an Authorized User - inspected and surveyed annually by Radiation Safety - Made safe (lockout/tagout) prior to any work inside the enclosure. All users must receive basic instruction on radiological risks and on the control measures for the device. Note: It is not necessary that users are UNLV radiation workers or that personal or area radiation dosimeters be used .
Non-medical 2	No risk that an individual working <u>outside</u> the enclosure will receive more than the annual dose limit for a member of the public (100 mrem/y) unless there is tampering with the device. An individual working <u>inside the enclosure while the beam is on</u> could exceed the maximum allowable dose to a member of the public. Reason: The beam is enclosed and well shielded, but work may be performed inside the enclosure when the beam is on. <i>Example:</i>	- Totally enclosed design with shielding and external surfaces that are fixed in place or are interlocked to control X-ray production. - An interlock override, or similar arrangement, allows work, such as repair/alignment/ sample placement/etc., to be done within the enclosure while the beam is on. - Radiation levels are less than 50 microR at in 1 hour at 30 cm from the surface of the device under all operating conditions	The device must be: - registered annually with the State of NV - authorized by Radiation Safety prior to operation - surveyed by Radiation Safety prior to initial operation and re-surveyed prior to operating after any activity that could impact external radiation levels - used under the direction of an Authorized User - inspected and surveyed annually by Radiation Safety - operated in an area posted for radiation use. Users who work <u>outside</u> the enclosure must receive basic instruction on radiation risks and the device's control measures. Users who work <u>inside the enclosure when the beam is on</u> must be trained as radiation workers Additional controls for all work done <u>inside the enclosure while the beam is on</u>: - AU must maintain and post explicit safety precautions. - physical controls must be in place to assure that only those individuals authorized by the AU work in the restricted area. - body badge and ring badges must be worn - there must be audible and/or visible warnings when beam is on.

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Non-medical 3	An individual working <u>outside or inside the enclosure while the beam is on</u> could exceed the maximum allowable dose to a member of the public. Reason: The beam is not enclosed, and/or the beam is enclosed, but shielding is not sufficient to limit individual doses outside the enclosure to less than 100 mrem/y, and/or work may be performed inside the enclosure when the beam is on. <i>Example:</i>	• The beam path may not be enclosed. • Shielding and external surfaces may not be fixed in place or may not be interlocked to control X-ray production • An interlock override, or similar arrangement, allows work, such as repair/alignment/ sample placement/etc., to be done within the enclosure while the beam is on • .Radiation levels are may exceed 50 microR at in 1 hour at 30 cm from the surface of the device	The device must be: 1. registered annually with the State of NV 2. authorized by Radiation Safety prior to operation 3. surveyed by Radiation Safety prior to initial operation and re-surveyed prior to operating after any activity that could impact external radiation levels 4. used under the direction of an Authorized User 5. surveyed by the user each time a non-interlocked part of the enclosure is removed 6. inspected and surveyed every six months by Radiation Safety 7. operated in an area posted for radiation use Warning signs and warning lines / barriers must be used to restrict access by non-radiation workers to areas where radiation levels exceed 50 uR in one hour (controlled areas). Warning signs and warning lines / barriers must be used to restrict all access to areas where radiation levels exceed 5,000 uR in one hour (radiation areas). Individuals who work outside the controlled area enclosure when the beam is on must receive basic instruction on radiation risks and the device's control measures. Individuals who work inside the controlled area or who work inside the enclosure when the beam is on must be trained as radiation workers. Individuals who operate the device must be trained as radiation workers <u>and</u> trained to operate the device properly by the AU. Additional controls for all work done within the controlled area or the enclosure while the beam is on: 1. AU must maintain and post explicit safety precautions. 2. physical controls must be in place to assure that only those individuals authorized by the AU work in the restricted area. 3. body badge and ring badges must be worn 4. there must be audible and/or visible warnings when beam is on.
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Medical 1	An individual working outside the device while the beam is on could exceed the maximum allowable dose to a member of the public. No exposure from working inside of the device. Reason: The beam is not enclosed. However, no work allowed inside the device while the beam is on.	• The beam path is not enclosed. • Shielding and external surfaces that are fixed in place or are interlocked to control X-ray production • Radiation levels are may exceed 50 microR at in 1 hour at 30 cm from the surface of the device under all operating conditions • Devices are certified by US FDA for use with human patients	The device must be: 1. registered annually with the State of NV 2. authorized by Radiation Safety prior to operation 3. surveyed by Radiation Safety prior to initial operation and re-surveyed prior to operating after any activity that could impact external radiation levels 4. used under the direction of an Authorized User 5. inspected and surveyed annually by Radiation Safety 6. operated in an area posted for radiation use Warning signs and warning lines / barriers must be used to restrict access by non-radiation workers who are not patients to areas where radiation levels exceed 50 uR in one hour (controlled areas). The design of the facility must allow operation while viewing the patient from either a distance of 6 feet or from behind a shielded barrier. Individuals who operate the device must be trained as radiation workers <u>and</u> trained to operate the device properly by the AU. Individuals may not hold patients without the specific approval of the AU.
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Notes: Note: Based on 50 uR/h external limit and 2000 hr/year, no individual would exceed the limit for a member of the public of 100 mrem per year. Individuals working on the device are prohibited from working inside of the enclosure while the beam is on.