University of Windsor Home **X-Ray User Registration**

**Full Name (Last, First): Employee/Student ID:**

**Supervisor (Last, First):**

**Table 1:** Annual dose equivalent limits for X-Ray Workers and X-Ray Users (O.Reg 861/90, section 10)

|  |  |  |  |
| --- | --- | --- | --- |
| **Part of the Body Irradiated** | **Exposure Conditions & Comments** | **Dose equivalent annual limits (millisieverts)** | |
| **Column 1** | **Column 2** | **Column 3**  **X-Ray workers** | **Column 4**  **X-Ray Users** |
| Whole Body or Trunk | Uniform irradiation | 50 | 5 |
| Partial or non-uniform Irradiation of body | Limit applies to the effective dose equivalent defined in O.Reg 861/90 (see Glossary) | 50 | 5 |
| Lens of Eye | Irradiated either alone or with other organs or tissues | 150 | 50 |
| Skin | Limit applies to mean dose equivalent to the basal cell layer of the epidermis for any area of skin of 1 square centimetre or more | 500 | 50 |
| Individual organ or Tissue  other than the Lens of eye or  skin | Limit on effective dose equivalent applies, with an the overriding limit on the dose equivalent to the individual organ or tissue | 500 | 50 |

You are being registered as an authorized X-Ray User. A meeting must be arranged with the X-Ray Safety Officer to discuss registration - Phone: (519) 253-3000 ext. 3524 or email: ccc@uwindsor.ca

As required by the X-Ray Safety Regulations made under the Occupational Health and Safety Act (O.Reg 861/90), section 9, the Employer, University of Windsor, must inform all X-Ray Users of the radiation dose equivalent annual limits of exposure to X-Ray Machines. Any X-Ray users who may be exposed to the dose equivalent (see glossary) in excess of the annual limits must be designated an X-Ray Worker.

Subsections 10(1) and (2) imposes limits as to the radiation exposure that you may receive as part of your employment. Doses are to be kept as low as reasonably achievable, and that in any case, as an x-ray user you shall not receive a dose equivalent in excess of the annual limits set out in Column 4 of Table 1.

If applicable, the University of Windsor shall take every reasonable precaution to ensure that the mean dose equivalent received by the abdomen of a pregnant x-ray user or pregnant x-ray worker does not exceed five millisieverts during the full term of the pregnancy. You are requested to notify the Manager of Environmental Health and Safety of any potential pregnancy to allow the University of Windsor to take appropriate measures to reduce your exposure to radiation.

**Licensed Dosimetry:** The University of Windsor manages a licensed dosimetry program with Health Canada in which X-Ray Users are welcome to participate if they would like to monitor any received dose. When meeting with the X-Ray safety officer, enrolment into the dosimetry program will be discussed and determined. Depending on the X-ray instrument being used, enrolment into the dosimetry program may be required or voluntary. If enrolled, a dosimetry badge will be issued and must be worn when using the X-ray instruments. The cost of the badge is covered by the Faculty member in charge of the research project. The application can be found on the CCC website. ([link](http://www1.uwindsor.ca/chemicalcontrol/system/files/hazardous_waste/radiation_safety_program/Application%20for%20Dosimetry%20Service.pdf))

X-Ray Users at the University of Windsor have never exceeded the annual limits set out in column 4 of Table 1. X-Ray Users are not expected to exceed the annual limits in column 4 during regular use of the current X-Ray instruments on campus. Nevertheless, a discussion between the X-Ray Safety Officer and the X-Ray user will determine whether enrolment into the dosimetry is required. Please note, that voluntary enrolment into the dosimetry program can be requested by the X-ray user or made mandatory by the X-ray safety officer at any time during the course of work with the X-ray instruments. Also please keep in mind that a dosimeter will not provide protection against radiation and only monitors any received dose.

**X-Ray User Signature:**

|  |  |
| --- | --- |
|  | initial below: |
| I acknowledge my registration as an X-Ray User and I am familiar with the dose equivalents that may be received as shown in table 1 | User initial |
| I have completed [X-Ray Safety Training](http://www1.uwindsor.ca/chemicalcontrol/x-ray-safety) and provided proof of training to my supervisor. | User initial |
| I will be instructed and will demonstrate competence on the safe operation of the X-Ray Instrument(s) I will use. | User initial |
| I have completed the [Laboratory Safety Orientation Checklist](http://www1.uwindsor.ca/chemicalcontrol/laboratory-safety-orientation-checklist-0). | User initial |
| I have read and understood this document and I understand that I am to receive the original copy of this letter. | User initial |

As Discussed with the X-Ray Safety Officer:

|  |  |  |
| --- | --- | --- |
| **I will enroll** in the licensed dosimetry program. | User initial | XSO initial |
| **I do not wish to voluntarily enroll** in the licensed dosimetry program. | User initial | XSO initial |

|  |  |  |  |
| --- | --- | --- | --- |
| **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** |  |  | **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** |
| X-Ray User Signature    **Employer Signature:** |  |  | Date |
| **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** |  |  | **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** |
| X-Ray Safety Officer (Chemical Control Centre) |  |  | Date |

**Distribution**: Original – Employee/Student; Copy 1 – XSO Files; Copy 2 – Lab Supervisor (Principal Investigator);

**Assistance, Information, and the World Wide Web:**

* The University of Windsor’s X-Ray Safety Program is available at: [**http://www1.uwindsor.ca/chemicalcontrol/x-ray-safety**](http://www1.uwindsor.ca/chemicalcontrol/x-ray-safety)
* This site contains the text of the University of Windsor’s X-Ray Safety Program, reference guides, contact information, and other radiation safety related information.
* Questions remaining unanswered after accessing this site, and requests for assistance should be directed to the X-Ray Safety Officer: Phone: (519) 253-3000 ext. 3524 or email: ccc@uwindsor.ca

**GLOSSARY**

**Absorbed Dose**

The “absorbed dose” means the mean energy per unit mass imparted by ionizing radiation to matter

**Dose Equivalent**

The “dose equivalent” means the product of absorbed dose and a quality factor where the quality factor is a measure of the biological effectiveness of the radiation, and is assigned the value 1.0 for X-rays;

**Effective Dose Equivalent**

The “Effective Dose Equivalent” is a way to quantify a worker’s overall risk due to a radiation exposure when only part of the workers body is exposed.

An example might be: a worker in a veterinary practice has taken a series of exposures over several weeks. The radiation dosimeter (worn outside the leaded apron at the neck) shows an exposure 0f 1.20 millisieverts. No further exposure is expected that year. Because the worker’s body was protected by the apron, this reported exposure is not a whole body dose (a measure of overall risk). One can calculate the equivalent risk to the worker from this partial exposure (only the head and neck\* in this case) using the formula below.

\* For the purposes of this example, we will assume that no thyroid collar was worn and that investigations reveal that the x-ray collimator was defective.

The Effective Dose Equivalent is determined by the following formula:

HE = ΣWTHT Where:

HE is the Effective Dose Equivalent

T is an index for tissue type

HT is the annual dose equivalent in tissue T

WT is a weighting factor which has the following values:

0.25 for the gonads

0.15 for the breast

0.12 for the red bone marrow

0.12 for the lungs

0.03 for the bone surface

0.03 for the thyroid

0.06 for each of the five other organs or tissues receiving the highest dose equivalent, but excluding the skin, extremities and eye lenses. The exposure of all other remaining tissues can be neglected. When the gastro-intestinal tract is irradiated, the stomach, small intestine, upper large intestine and lower large intestine shall be considered as four separate organs.

ΣT WTHT is the sum of the WTHT values for all irradiated tissues which receive more than 1 millisievert in a given year

The Effective Dose Equivalent in our example would be 0.03 \* 1.20 = 0.04 millisieverts The lens of the eyes are treated separately with an annual limit of 150 millisieverts.

The annual limits do not include any dose equivalent received by a worker from background sources, or received as a patient undergoing medical diagnostic or therapeutic procedures e.g. the worker must not be wearing their radiation dosimeter when they undergo radiation exposure as a patient (get an x-ray).

The annual limits include any dose equivalent received by a worker, as a consequence of his or her occupation, from all sources of ionising radiation.