

**KINGSTON GENERAL HOSPITAL  
IMAGING SERVICES  
76 Stuart Street  
Kingston, Ontario  
K7L 2V7**

Dear \_\_\_\_\_ (worker name)

As required by the X-Ray Regulations respecting X-Ray Safety made under the Occupational Health and Safety Act (O.Reg 861/90), section 9, I hereby inform you that you are employed as an X-Ray Worker.

Subsection 10 imposes limits as to the radiation exposure that you may receive as part of your employment. They are: that doses are to be kept as low as reasonably achievable, and that in any case, as an x-ray worker you shall not receive a dose equivalent in excess of the annual limits set out below.

Part of the Body Irradiated	Exposure Conditions & Comments	Dose Equivalent Annual Limit for X-Ray workers (millisieverts)
Whole Body or trunk	Uniform irradiation	50
Partial or non-uniform Irradiation of body	Limit applies to the effective dose equivalent defined in O.Reg 861/90 (see over)	50
Lens of Eye	Irradiated either alone or with other organs or tissues	150
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
Individual organ or Tissue other than the Lens of eye or skin	Limit on effective dose equivalent applies, with an overriding limit on the dose equivalent to the individual organ or tissue	500

(If applicable) Your employer shall take every precaution reasonable in the circumstances to ensure that the mean dose equivalent received by the abdomen of a pregnant x-ray worker does not exceed five millisieverts during the pregnancy.

Sincerely,

\_\_\_\_\_  
(name of employer or employer's rep) dated \_\_\_\_\_

(The worker is given this letter by the employer, it is suggested that the employer retain a copy of the letter for his/her files which has been signed by the worker, see below)

Your signature here indicates that you have read and understood this document and that you have received the original

\_\_\_\_\_  
(Worker Signature), dated \_\_\_\_\_

## 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 lead apron at the neck) shows an exposure of 1.20 millisieverts. No further exposure is expected that year. Because the apron protected the worker’s body, 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:

$$H_E = \sum W_T H_T$$

Where:

$H_E$  is the Effective Dose Equivalent

$T$  is an index for tissue type

$H_T$  is the annual dose equivalent in tissue  $T$

$W_T$  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.

$\sum W_T H_T$  is the sum of the  $W_T H_T$  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 lenses 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.