Notification of Nuclear Energy Worker Status

Surname: _____ **Given Name(s):** _____

Department: _____ **Sex:** M ☐ F ☐

As required by the Canadian Nuclear Safety Commission, in accordance with the Nuclear Safety and Control Act (NSCA) and its regulations, this is to inform you that you are a Nuclear Energy Worker (NEW). As defined in the NSCA, a NEW is a person who is required, in the course of the person's business or occupation in connection with a nuclear substance or nuclear facility, to perform duties in such circumstances that there is a reasonable probability that the person may receive a dose of radiation that is greater than the prescribed dose limit for the general public.

The University of Guelph however stresses adherence to the ALARA policy of maintaining doses: As Low as Reasonably Achievable.

Our procedures and policies are directed towards your safety, ensuring that the potential for exposure is minimized. The University of Guelph notifies users of radioactive materials of their classification as "Nuclear Energy Workers" if there is a reasonable probability of receiving an effective dose greater than that allowed to members of the general public (i.e. 1 mSv per annum whole body).

The following documents are provided for your information:

1. The risks associated with radiation to which you may be exposed during your work, including the risk associated with the exposure of an embryo and fetus
2. The applicable dose limits as specified in the regulations
3. Your expected radiation dose levels
4. The rights and obligations for workers that become pregnant (section 4)

I have read the above documents and I understand the risks, my obligations and the radiation dose limits that are associated with being classified as a NEW.

Signature of Worker: _____

Signature of Radiation Safety Officer: _____

Date: _____

1) RISKS ASSOCIATED WITH RADIATION

Health Physics Society Statement*:

In accordance with current knowledge of radiation health risks, the Health Physics Society recommends against quantitative estimation of health risks below an individual dose of 50 mSv in one year or a lifetime dose of 100 mSv above that received from natural sources. Doses from natural background radiation in Canada & the United States average about 3 mSv. A dose of 50 mSv will be accumulated in the first 17 years of life and about 250 mSv in a lifetime of 80 years. Estimation of health risk associated with radiation doses that are of similar magnitude as those received from natural sources should be strictly qualitative and encompass a range of hypothetical health outcomes, including the possibility of no adverse health effects at such low levels.

There is substantial and convincing scientific evidence for health risks following high-dose exposures. However, below 50-100 mSv (which includes occupational and environmental exposures), risks of health effects are either too small to be observed or are nonexistent.

In part because of the insurmountable intrinsic and methodological difficulties in determining if the health effects that are demonstrated at high radiation doses are also present at low doses, current radiation protection standards and practices are based on the premise that any radiation dose, no matter how small, may result in detrimental health effects, such as cancer and hereditary genetic damage. Further, it is assumed that these effects are produced in direct proportion to the dose received, that is, doubling the radiation dose results in a doubling of the effect. These two assumptions lead to a dose-response relationship, often referred to as the linear, no-threshold model, for estimating health effects at radiation dose levels of interest. There is, however, substantial scientific evidence that this model is an oversimplification. It can be rejected for a number of specific cancers, such as bone cancer and chronic lymphocytic leukemia, and heritable genetic damage has not been observed in human studies. However, the effect of biological mechanisms such as DNA repair, bystander effect, and adaptive response on the induction of cancers and genetic mutations are not well understood and are not accounted for by the linear, no-threshold model.

Radiogenic Health Effects Have Not Been Consistently Demonstrated Below 100 mSv Lifetime

Radiogenic health effects (primarily cancer) have been demonstrated in humans through epidemiological studies only at doses exceeding 50-100 mSv delivered at high dose rates. Below this dose, estimation of adverse health effect remains speculative. Risk estimates that are used to predict health effects in exposed individuals or populations are based on epidemiological studies of well-defined populations (for example, the Japanese survivors of the atomic bombings in 1945 and medical patients) exposed to relatively high doses delivered at high dose rates. Epidemiological studies have not demonstrated adverse health effects in individuals exposed to small doses (less than 100 mSv) delivered in a period of many years.

Limit Quantitative Risk Assessment to Doses at or Above 50 mSv (5 Rem) per Year or 100 mSv (10 Rem) Lifetime

In view of the above, the Society has concluded that estimates of risk should be limited to individuals receiving a dose of 50 mSv in one year or a lifetime dose of 100 mSv in addition to natural background. In making risk estimates, specific organ doses and age-adjusted and gender adjusted organ risk factors should be used. Below these doses, risk estimates should not be used. Expressions of risk should only be qualitative, that is, a range based on the uncertainties in estimating risk (NCRP 1997) emphasizing the inability to detect any increased health detriment (that is, zero health effects is a probable outcome).

Impact on Radiation Protection

Limiting the use of quantitative risk assessment, as described above, has the following implications for radiation protection: (a) The possibility that health effects might occur at small doses should not be entirely discounted. The Health Physics Society also recognizes the practical advantages of the linear, no-threshold hypothesis to the practice of radiation protection. Nonetheless, risk assessment at low doses should focus on establishing a range of health outcomes in the dose range of interest and acknowledge the possibility of zero health effects. These assessments can be used to inform decision making with respect to cleanup of sites contaminated with radioactive material, disposition of slightly radioactive material, transport of radioactive material, etc. (b) Collective dose (the sum of individual doses in a defined exposed population expressed as person-rem) has been a useful index for quantifying dose in large populations and in comparing the magnitude of exposures from different radiation sources. However, collective dose may aggregate information excessively; for example, a large dose to a small number of people is not equivalent to a small dose to many people, even if the collective doses are the same. Thus, for populations in which almost all individuals are estimated to receive a lifetime dose of less than 100 mSv above background collective dose is a highly speculative and uncertain measure of risk and should not be used for the purpose of estimating population health risks.

* Feinendegen, Ludwig E. "Radiation Risks in Perspective." *Health Physics*93.4 (2007): 329-30. Web: http://hps.org/hpspublications/positionstatements.html. The Health Physics Society is a nonprofit scientific professional organization whose mission is excellence in the science and practice of radiation safety. Since its formation in 1956, the Society has grown to approximately 6,000 scientists, physicians, engineers, lawyers, and other professionals representing academia, industry, government, national laboratories, the Department of Defense, and other organizations. Society activities include encouraging research in radiation science, developing standards, and disseminating radiation safety information. Society members are involved in understanding, evaluating, and controlling the potential risks from radiation relative to the benefits. Official position statements are prepared and adopted in accordance with standard policies and procedures of the Society. The Society may be contacted at 1313 Dolley Madison Blvd., Suite 402, McLean, VA 22101; phone: 703-790-1745; fax: 703-790-2672; email: HPS@BurkInc.com.

2) APPLICABLE DOSE LIMITS AS PER REGULATIONS

Annual Exposure Limits

Tissue or Organ	Nuclear Energy Worker (NEW) (mSv)	Non-Nuclear Energy Worker (mSv)
Whole Body	20**	1
Head	150	15
Extremities	500	50
Skin	500	50
Lens of the Eye	20	5
Pregnant Workers	4	1

** NEWs may receive up to 50 mSv in a year and total dose of 100 mSv in a five-year dosimetry period. The average annual dose limit in the 5-year period is 20 mSv.

3) EXPECTED RADIATION DOSE LEVELS

All NEWs will be monitored with TLD/OSL monitors from a *CNSC approved dosimetry service provider*. All exposures must be reported to the RSO. Dosimeters will only be issued upon the completion of radiation safety training.

All records of dosimetry are reviewed by the Radiation Safety Officer. Records are maintained at the EHS office.

The University of Guelph radiation safety program follows the ALARA principle and is designed to ensure workers are continuously protected and are properly trained. Even though the annual dose limit for Nuclear Energy Workers is 50 mSv per year in Canada and an average of 20 mSv over five years, we try to maintain an annual dose for each user that is a fraction of that.

The University of Guelph sets ‘Action levels’ as per the ‘*Radiation Protection Regulations’*. The action level set is at 2 mSv year. Once the action level is reached the RSO will investigate the causes of exposure and may modify work patterns to keep doses ALARA.

4) PREGNANT NUCLEAR ENERGY WORKERS

A pregnant nuclear energy worker must not receive an effective dose of greater than **4 mSv** for the balance of the pregnancy.

The balance of the pregnancy is defined as "the period from the moment the RSO is informed, in writing, of the pregnancy to the end of the pregnancy".

As soon as a female Nuclear Energy Worker is aware of her condition, she must inform Occupational Health and Wellness and/or the RSO of her condition.

The University of Guelph Pregnancy Protocol will be followed. All pregnant NEWs will be monitored with an appropriately modified schedule using TLD/OSL monitors from a CNSC approved service provider. The University may also make any reasonable accommodation to maintain effective doses As Low as Reasonably Achievable.

It may be pertinent to note that it is a regulatory obligation and in her own best interest, that a female Nuclear Energy Worker (NEW) inform Occupational Health and Wellness and/or the RSO in writing of being pregnant immediately upon becoming aware of the fact. When a state of pregnancy is established the RSO along with the supervisor may modify work patterns to keep doses ALARA and well below regulatory limit.