

RI-03

RI-03 PREGNANT WORKERS' DECLARATION AND RISKS

PURPOSE

This information is used to provide a declaration of pregnancy, define limitations on the occupational exposure to ionizing radiation of declared pregnant personnel, establish procedures to ensure adequate communication of associated risks, and to provide information on ways to minimize the exposure to the developing embryo/fetus.

RULES AND REGULATIONS

It is the choice of the individual to declare pregnancy. To voluntarily declare pregnancy, an individual must provide their name, a declaration that they are pregnant, the estimated date of conception (only the month and year are required) and the date that the letter was given to the Radiation Control Office (RCO) or the Principal User (PU). The individual does not have to disclose the pregnancy to the PU and does not have to have medical proof of pregnancy, but the declaration must be in writing. If the PU or RCO does not receive the voluntary written declaration of pregnancy, or the PU is informed that an individual is planning to become pregnant but is not currently pregnant, the lower dose limits established by the State do not apply. If the employee chooses to declare pregnancy through the PU, the PU has the responsibility to provide any documentation of the voluntary declaration to the RCO. The attached RF-3A form may be used for declaration of pregnancy. Any other written declaration will be accepted if the required information stated above is included. The lower dose limit applies to a declared individual's fetus until the RCO has been informed the individual no longer wishes to be considered pregnant.

The individual that voluntarily declares pregnancy can continue to perform their job with no changes. An individual cannot be terminated, demoted, or have hourly wages or salary reduced due to pregnancy. Substitute duties away from radiation areas can be requested by the employee during pregnancy but cannot be forced upon the employee by University administration unless the dose limit is reached for the fetus.

When the declared individual no longer considers herself pregnant, she should promptly inform her PU or the RCO in writing that she is no longer pregnant. The individual may revoke the voluntary declaration of pregnancy at any time for any reason (NRC Regulatory Guide 8.13). If the declared individual does not inform the RCO or PU in writing of the end of her pregnancy, the RCO will terminate her designation one year after the conception date.

PROCEDURES

Once a declaration of pregnancy has been received by the RCO, the fetal committed effective dose limit of 0.5 rem during the entire pregnancy will be assigned to the individual employee. The voluntarily declared pregnant worker will also be limited to no more than a fetal committed effective dose limit of 50 mrem in any one month during the pregnancy. Substantial variation above a uniform monthly dose rate will be avoided, if possible, so that the dose received does not occur during a particular time of the pregnancy. If by the time the individual voluntarily declares pregnancy and the dose to the embryo/fetus has exceeded 0.45 rem, the dose to the fetus for the remainder of the pregnancy shall not exceed 0.05 rem (CDPHE 4.13).

The RCO will review the individual personal exposure monitoring history (if previously badged) to determine prior exposure levels and estimate anticipated exposure levels for the remainder of the pregnancy. If the pregnant individual was not previously monitored for radiation exposure, an average exposure for badged workers in the same work assignment area will be used for estimate of anticipated fetal exposure. This information will be provided to and reviewed with the employee using form RF-3B.

The RCO will order and provide a fetal monitor that must be worn on the anterior aspect of the body at waist level and is to be worn under a lead apron if applicable. The monthly occupational exposure to the declared pregnant individual will be reviewed by the RCO and documented monthly to ensure dose limits are not exceeded and that the declared pregnant individual is not being exposed to unnecessary variations of ionizing radiation.

The Radiation Control Office discourages the use of potentially volatile radioisotopes by pregnant individuals. If the declared employee works with radioactive materials that can be ingested or inhaled, a bioassay involving a urine or fecal sample may be requested depending on the amount/frequency of use, the isotope, and the chemical compound. Pregnant individuals utilizing radioiodine or providing care for radioiodine patients will be requested to submit to thyroid bioassay exams at frequencies determined by the amount/frequency of use, the isotope, and chemical compound. Potential internal exposure to the fetus will be calculated as needed based on maternal bioassay results.

These instructions will be provided to the individual and any questions or concerns that the individual may have can be discussed with the Radiation Safety Officer (RSO) by calling the RCO and having the questions answered over the telephone or by scheduling a meeting with the RSO to discuss any questions and concerns. The individual will sign form RF-3C form acknowledging that they have been informed of the risks to the embryo/fetus associated with continued occupational exposure to ionizing radiation. Form RF-3C also states that the individual acknowledges that

methods used to minimize exposure to ionizing radiation have been reviewed in the radiation safety project submitted by the PU and approved by the Radiation Safety Committee. The form also acknowledges that the individual exposure history and an estimate of the potential exposure during pregnancy has been provided and reviewed by the individual.

Upon termination of the declaration of pregnancy, the RCO will provide a copy of the fetal monitor exposure record to the individual upon request. A copy signed by the RSO and the individual will be retained in the personnel file for the individual.

POSSIBLE HEALTH RISKS

The purpose of the lower limit is to protect the unborn child. Scientific advisory groups recommend a lower limit because of the sensitivity of the embryo/fetus to radiation. Possible effects include deficiencies in the child's development, especially the child's neurological development and an increase in the likelihood of cancer.

The effects of large doses of radiation on human development are quite evident and easily measurable, whereas at low doses the effects are not evident or measurable and therefore must be inferred.

The developing human brain has been shown to be especially sensitive to radiation. Some groups exposed to radiation *in utero* have shown lower than average intelligence scores and poor performance in school.

Scientists are uncertain whether there are developmental effects at doses below 5 rem because developmental effects caused by radiation have not been observed in human groups below this level. It may be that the effects are present but are too mild to measure because of the normal variability from one person to the next and because the tools to measure the effects are not sensitive enough. There may also be some threshold dose below which there are no developmental effects whatsoever.

In view of the possibility of developmental effects, even if very mild, at doses below 5 rem, scientific advisory groups consider it prudent to limit the dose to the embryo/fetus to 0.5 rem.

The evidence for increased sensitivity of the embryo/fetus to cancer induction from radiation exposure is inconclusive; it is prudent to assume that there is some increased sensitivity. Scientific advisory groups assume that radiation exposure before birth may be 2 or 3 times more likely to cause cancer over a person's lifetime than the same amount of radiation received as an adult. Again, scientific advisory groups recommend that the dose to the embryo/fetus be limited to a maximum of 0.5 rem. At that dose, there would be 1 radiation-induced cancer death per 2000

people. This would be in addition to the 500 cancer deaths from all causes that one would normally expect in a group of 2000 people.

The risk to the embryo/fetus from 0.5 rem or even 5 rem of radiation exposure is relatively small compared to some other avoidable risks such as drinking or smoking during pregnancy.

The individual may ask the PU for a job that does not involve any exposure to occupational radiation, but the PU may not have such a job or may not be willing to provide you with a job involving no radiation exposure. Even if the individual receives no occupational exposure at all, the individual will receive a dose typically of about 0.3 rem from unavoidable background radiation.

The table below gives an example of background radiation that is normally occurring. Natural radiation from radon and soil and rocks depends on the location in the US. In areas where there is exposed rock, like in Colorado, the level is higher and in locations like flood plains in the southeast US, the levels are lower. Cosmic radiation increases with elevation. In Colorado the cosmic radiation is higher than at locations at sea level. In every human there are naturally occurring radionuclides. Studies have been performed to determine the dose to individuals sleeping next to each other from internal radionuclides in the other individual. The dose range takes into account these differences in background levels.

	Average Annual Dose
Terrestrial - radiation from soil and rocks	30 millirem
Radon	200 millirem
Cosmic - radiation from outer space	30 millirem
Radioactivity normally found within the human body	40 millirem
Total	310 millirem
Dosage range (geographical and other factors)	75 to 5,000 millirem

(NRC Regulatory Guide 8.13)

The first two of these sources expose the body from the outside, and the last one exposes the body from the inside.

Medical procedures may also contribute to the dose people receive. The following table lists the average doses received by the bone marrow (the blood-forming cells) from different medical applications.

X-Ray Procedure	Average Dose*
Normal chest examination	10 millirem
Normal dental examination	10 millirem
Rib cage examination	140 millirem
Gall bladder examination	170 millirem
Barium enema examination	500 millirem
Pelvic examination	600 millirem

* Variations by a factor of 2 (above and below) are not unusual (NRC Regulatory Guide 8.13)

STEPS TO LOWER RADIATION EXPOSURE

The ALARA principle is required for any ionizing radiation project approved by the Radiation Safety Committee. The safety procedures outlined in the project application are required to be followed at all times. Training provided by the RCO also teaches ways to reduce internal and external exposure to radiation by using time, distance, shielding, engineering controls, proper PPE and other means. Certain general precautions to avoid internal radiation exposure might include the following:

1. Do not smoke, eat, drink or apply cosmetics around radioactive material.
2. Do not pipette solutions by mouth.
3. Use 2 pair of disposable gloves while handling radioactive material when feasible.
4. Wash hands after working around radioactive material.
5. Wear lab coats and full coverage of feet and legs or other protective clothing whenever there is a possibility of spills.

RF-3A Declaration of Pregnancy

This form letter is provided for your convenience. To make a declaration of pregnancy, you may fill in the blanks in this form letter and give it to your Principal User or the Radiation Control Office - you may also write your own letter.

To: _____
(Principal User and/or Radiation Control Office)

I am declaring that I am pregnant. I estimate my conception date to be approximately _____ (only the month and year need to be provided).

If I find out that I am not pregnant, or if my pregnancy is terminated, I will promptly inform my PU or the RCO in writing that my pregnancy has ended.

(Individuals Signature)

(Printed Name)

(Date Submitted to PU and /or RCO)

RF-3B Estimation of Potential Exposure

Last Name: _____ First Name: _____

ID#: _____

Principal User: _____

a) Date of Voluntary Declaration of Pregnancy: _____

b) Estimated Conception Date (Mo, Yr): _____

c) Personnel WBCH* Monitoring Start Date: _____

d) Number of Months of prior WBCH Personnel Monitoring: _____

e) Cumulative Effective Dose Indicated by Personnel Monitoring: _____ mrem

f) Effective Dose rate estimated by series average dose, specific laboratory data, or radiation safety plan estimation: _____ mrem/month

g) Estimated Total Effective Dose for Pregnancy _____ mrem

NOTES:

Radiation Control Office Staff Member and title (Please Print)

Signature

Date

*WBCH – Whole Body Chest badge

RF-3C Acknowledgment of Understanding

1. I acknowledge that I have been informed of the risks to my embryo/fetus associated with my continued occupational exposure to ionizing radiation and that I have been instructed in the methods that may be used to minimize my exposure.
2. I acknowledge that my exposure history and/or an estimate of my potential exposure during my pregnancy, based on the results of personnel monitoring or estimation has been provided to me. I can request a meeting at any time to review this information if I have questions about my dose or estimate of dose. I understand that my actual exposure during my pregnancy will be closely monitored and documented and will be provided to me upon receipt by the RCO that I am no longer declaring myself pregnant.
3. I have read and understand the potential radiation risks to myself and my unborn child, if any, if I work in such radiation areas.

Name (Please Print)

CSU ID #

Signature

Date

PU Name (Please Print) (optional)

PU Signature (optional)

Date