

PRENATAL RADIATION EXPOSURE POLICY

A. DEFINITIONS

Declared Pregnant Woman is a woman who, in accordance with federal and state regulations, voluntarily informs the UCI Radiation Safety Officer, in writing, of her pregnancy and the estimated date of conception.

Total Effective Dose Equivalent (TEDE) to the declared pregnant woman is the sum of her Deep Dose Equivalent and her Committed Effective Dose Equivalent.

- **Deep Dose Equivalent (DDE)** is the dose from external exposure due to gamma, x-ray or neutron radiation (measured by, for example, the heavily shielded area of a film badge).
- **Committed Effective Dose Equivalent (CEDE)** is the weighted sum of the doses from internal exposure to all organs and tissues of the body over the 50 years after intake from radioactive materials taken into the body (measured by, for example, thyroid counts or urine radiochemistry).

The **Dose Equivalent to the Embryo/Fetus** is the total dose equivalent to the embryo/fetus during the entire 9 month gestation period. It is the sum of:

- The **Deep Dose Equivalent to the declared pregnant woman** during pregnancy.
- The dose equivalent to the embryo/fetus from **radionuclides in the embryo/fetus** during pregnancy. It is the actual dose received, not a committed dose to be received over a period of up to 50 years.
- The dose equivalent to the embryo/fetus from **radionuclides in the declared pregnant woman** during pregnancy.

B. FEDERAL AND STATE REGULATIONS

Federal and state regulations for dose limits and individual monitoring of women who are pregnant and their developing embryo/fetuses are as follows:

1. A declared pregnant woman is limited to a **Dose Equivalent to the Embryo/Fetus of 500 millirems** during her pregnancy, delivered at a recommended rate of approximately 50 millirems per month or less.
2. A declared pregnant woman is required to be monitored for doses from external exposure if she is likely to receive, while she is pregnant, a

DDE of greater than 50 millirems per year.

3. A declared pregnant woman is required to be monitored for doses from internal exposure if she is likely to receive, while she is pregnant:
 - a. A CEDE of greater than 50 millirems per year, or,
 - b. A Dose to the Embryo/Fetus of greater than 50 millirems per year from radionuclides in the embryo/fetus and in the declared pregnant woman.
4. If a pregnant woman chooses **not to become a declared pregnant woman**, the appropriate dose limits and monitoring procedures apply based on her status as an adult or a minor under age 18.

C. UC IRVINE PROCEDURES FOR WOMEN WHO ARE PREGNANT

The UC Irvine campus has adopted specific procedures regarding radiation exposure to women who are pregnant or who are planning to become pregnant.

1. Exposure of Pregnant Women

- a. Federal and state regulatory agencies have established the category of declared pregnant woman in order to address two competing objectives of national policy. These objectives are:
 - (1) The desire to establish a legal mechanism to offer special protection to the developing embryo/fetus by limiting external and internal doses to levels lower than those established for the mother.
 - (2) Decisions of the U.S. Supreme Court which prohibit the establishment of mandatory legal dose limits for women which are lower than the legal dose limits for men.
- b. Therefore, each woman must choose to become a declared pregnant woman if she wants to have voluntary lower legal dose limits for the exposure of her developing embryo/fetus.
- c. UC Irvine procedures establish administrative criteria for external and/or internal dosimetry for declared pregnant women which are often lower (e.g., for penetrating gamma radiation emitters) than those established for adults who are not declared pregnant women.
- d. Radiation emitted by radionuclides that are pure beta emitters (e.g., which do not emit gamma rays) will not penetrate into the uterus. Therefore, external exposure from P-32 and other beta

emitters should not be of concern to prospective mothers.

2. Specific Information for Prospective Mothers

It is UC Irvine's campus policy to inform female radiation workers (employees and students) of:

- a. The risks to the developing embryo/fetus from exposures to ionizing radiation.
- b. The options available to prospective mothers to maintain such exposures as low as reasonably achievable below the in utero legal limit of 500 millirem (for declared pregnant women) during pregnancy for external and internal exposures.
- c. That all such workers are strongly encouraged to contact the EH&S Office if they have any questions regarding radiation exposures during pregnancy.

3. Special Precautions for Prospective Mothers

Precautions required or recommended for prospective mothers (i.e., those who are pregnant or who are actively trying to become pregnant) who choose to continue working with or around radioactive materials and/or radiation-producing equipment, include:

- a. The prospective mother should avoid situations where her abdomen may be exposed to penetrating radiation (gamma, x-ray, neutron) levels greater than 2 millirems per hour or 10 millirems per week.
- b. Protective aprons may be worn, if appropriate, for the energy and type of radiation encountered. Thin lead aprons may be used for x-rays, but they are not recommended for use with gamma emitters (such as Cr-51) or high energy beta emitters (such as P-32).
- c. The EH&S Office may issue a radiation dosimeter to a declared pregnant woman to be used as a "fetal monitor" to assess penetrating radiation exposures (from external sources) to the prospective mother's abdomen whenever it is likely to receive a deep dose equivalent of more than 50 millirems in a year and the woman's usual dosimeter is likely to measure doses that are less than the doses to the abdomen.
- d. If the deep dose equivalent to the fetal monitor of a declared pregnant woman equals or exceeds 50 millirems per month for more than two consecutive months of a pregnancy, the

prospective mother's work will usually be reviewed to determine if restrictions are necessary to reduce further exposures during the remainder of the pregnancy.

- e. If the dose equivalent to the embryo/fetus of a declared pregnant woman exceeds 500 millirems during her pregnancy, the woman will normally be required to avoid all further occupational and educational radiation exposures until after the birth of her baby.
- f. The prospective mother should avoid working with volatile or reactive radiochemicals which could result in the inhalation, ingestion, or absorption of radioactive materials through her skin.
 - (1) While pregnant, she should not perform either iodinations using radioiodine or labeling procedures using tritiated water or borohydride.
 - (2) Nursing mothers should also avoid such procedures.
- g. In any case of suspected accidental exposure to radiation sources or intake of radioactive materials, the prospective mother should contact the EH&S Office immediately, or call campus police after hours, or on weekends or holidays.

(Approved by the University of California, Irvine Campus Radiation Safety Committee on December 7, 1993)

PRENATAL RADIATION EXPOSURE RISKS AND PRECAUTIONS

I have received information regarding the risks of prenatal radiation exposure to the developing embryo/fetus, the limits for such exposure and the UCI policy and options available to me to maintain such exposures as low as reasonably achievable (ALARA).

If I wish to continue working with and/or around radiation sources while I am pregnant, I understand that UCI policy encourages me:

- (1) To become a declared pregnant woman by notifying the UCI Radiation Safety Officer, in writing, of my pregnancy and the estimated date of conception.
- (2) To consult with EH&S as early as possible to discuss any particular concerns which I may have regarding this issue.

Please sign below and print the requested additional information in ink.

(My Signature)

(Date of Signature)

(My Full Legal Name)

(Department)

(Responsible Principal Investigator)

PLEASE RETURN THIS FORM TO UCI RADIATION SAFETY
at
ENVIRONMENTAL HEALTH AND SAFETY, ZOT CODE 2725