ALL AGREEMENT STATES
MASSACHUSETTS, PENNSYLVANIA, OHIO, AND OKLAHOMA

APR 10 1996

TRANSMITTAL OF STATE AGREEMENTS PROGRAM INFORMATION (SP-96-045)

Your attention is invited to the enclosed correspondence which contains:

INCIDENT AND EVENT INFORMATION.....

PROGRAM MANAGEMENT INFORMATION.....

TRAINING COURSE INFORMATION.....XX Diagnostic & Therapeutic Nuclear Medicine for NRC Inspectors

TECHNICAL INFORMATION.....

OTHER INFORMATION.....

Supplementary information: The NRC has scheduled two courses for June 17-21, 1996 and August 5-9, 1996 entitled, "Diagnostic and Therapeutic Nuclear Medicine for NRC Inspectors." These courses will be held at the Advanced Health Education Center in Houston, Texas. Enclosed is course information, a blank application form, a typical class schedule, and a copy of Draft Regulatory Guide DG-8014. **Applications for the June course should be submitted no later than April 26, 1996. Applications for the August course should be submitted no later than June 10, 1996.**

If you have any questions regarding this correspondence, please contact the individual named below.

POINT OF CONTACT: Lloyd Bolling
TELEPHONE: (301) 415-2327
FAX: (301) 415-3502
INTERNET: LAB@NRC.GOV

Original Signed By:
PAUL H. LOHAUS

Paul H. Lohaus, Deputy Director
Office of State Programs

Enclosures:
As stated

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DATE	04/8 /96		04/9 /96		04/09/96					

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

April 10, 1996

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Paul H. Lohaus, Deputy Director
Office of State Programs

Enclosures:
As stated

Course Information

Title of Course: Diagnostic and Therapeutic Nuclear Medicine Course (H-304)

Location: The Advanced Health Education Center
Houston, Texas

Period: June 17-21, 1996

Description: The course provides an understanding of basic radiation biology; the facilities and equipment used in nuclear medicine departments; clinical diagnostic and therapeutic procedures involving the administration of radiopharmaceuticals to patients; safe handling of patients and the protection of staff and visitors; area radiation surveys; responsibilities of key personnel; function of the Radiation Safety Committee; ALARA program; and training requirements. Diagnostic and therapeutic misadministration, transport of radioactive materials and emergency procedures and recordkeeping requirements, quality assurance, calibrations and waste disposal are also covered. Opportunities are provided for hands-on experience. Relevant portions of 10 CFR Part 35, Medical Use of Byproduct Material" and USNRC Regulatory Guide 10.8, "Guide for the Preparation of Applications for Medical Use Programs" are emphasized.

Prerequisites: A knowledge of basic radiation protection is necessary. A hand-held calculator with exponential and logarithmic functions is recommended.

Length: 5 Days 40 Instructional Hours

Examination: Written comprehensive final examination.

Costs: The NRC is authorized to reimburse participants within specified limits, for per diem travel.

Applications: Should be submitted in duplicate no later than **April 26, 1996 for the June course or June 10, 1996 for the August course.**

Lloyd Bolling
Office of State Programs
Mail Stop 3-D-23
Washington, DC 20555

Acceptance: A written acceptance letter will be sent to the Program Director regarding each candidate selected to attend this course.

APPLICATION FOR TRAINING
(Please Type)

Date: _____

A. To be completed by Applicant

1. Title of Course: _____
   Dates of Course: _____

2. Name of Applicant: _____ Social Security #: _____
   Citizenship: ( ) USA _____ ( ) Other: (Specify) _____
   Home Address: _____
   _____
   Home Telephone No.: _____
   Business Address: _____
   _____
   _____
   _____
   Business Telephone No.: _____
   Business FAX Telephone No.: _____

3. Academic Record of Applicant:

Institution	Degree	Date	Major	Minor

Check College courses which you have taken and give number of semester hours.

( ) College Algebra _____
( ) Calculus _____
( ) College Physics _____
( ) Atomic/Nuclear Physics _____
( ) Radiation Physics _____
( ) Electronics _____

4. Applicant's Current Title: _____
   Length of time in current position: _____
   Description of current duties: _____
   _____
   _____
   _____

5. Pertinent Employment History:

Dates	Title	Description of Duties

6. List any previous training in health physics.

_____
_____
_____
_____
_____
_____

7. Travel Information:

Point of Departure: _____ By Air ( ) By Automobile ( )
If you plan to travel by automobile, indicate approximate roundtrip mileage _____.

8. For Female Applicants

This acknowledges that I have received, read, and understand the contents of US NRC Draft Regulatory Guide DG-8014, Instruction Concerning Prenatal Radiation Exposure; and the Appendix to NRC Draft Regulatory Guide DG-8014, Instructions Concerning Pregnant Women.

_____
Signature of Applicant

B. The following is to be completed by the State Radiation Control Program Director.

1. Please provide a brief statement indicating why you want this individual to attend this course.

_____
_____
_____
_____
_____
_____

2. Does attendance at this course require the approval of another agency or management official? If so, please have official sign appropriate block.

_____ _____
Signature of Other Approving Official

Signature of Radiation Control Program Director

The typed or printed application should be sent to:

Lloyd Bolling
Mail Stop 3D23
Office of State Programs
U.S. Nuclear Regulatory Commission
Washington, DC 20555

or FAXED to Office of State Programs: 301-415-3502

DIAGNOSTIC AND THERAPEUTIC NUCLEAR MEDICINE

NRC COURSE OUTLINE

I. Introduction

- A. Course
- B. Overview of Nuclear Medicine
- C. Terminology

II. Counting Equipment

- A. Principles of Operation
- B. Components
- C. Equipment
  1. Well counter
  2. Thyroid probe
  3. Liquid scintillation counter
- D. Quality Control
  1. Calibration
  2. Energy resolution

III. Radiopharmacy Equipment

- A. Dose Calibrator
  1. Operation
  2. Quality Control
     a. Constancy
     b. Accuracy
     c. Linearity
     d. Geometry
- B. Alarm Rate Meter

IV. Imaging Equipment

- A. Principles of Operation
- B. Components
- C. Cameras
  1. Stationary
  2. Mobile
  3. Tomographic
  4. Multicrystal
- D. Quality Control
  1. Uniformity
  2. Spatial resolution
  3. Linearity
  4. Sensitivity
  5. Attenuation Correction

V. Radiation Safety Equipment

A. G-M Survey Meter
B. Pocket Dosimeter
C. "Cutie Pie"
D. Film Badge and TLD

VI. Clinical Radiation Safety Concerns

A. Time, Distance and Shielding
B. Area Surveys and Wipe Test
C. Personnel Monitoring
D. ALARA
E. Receipt of Radioactive Shipments
F. Disposal of Low-level Radioactive Waste
G. Radiation Accidents and Decontamination

VII. Radiation Safety Program

A. Components of Program
B. Review of Program

VIII. Patient Procedures in Nuclear Medicine

A. Diagnostic Procedures
    1. Cardiovascular
    2. Central nervous system
    3. Endocrine
    4. Gastrointestinal
    5. Hematology
    6. Infection
    7. Pulmonary
    8. Skeletal
    9. Tumor
B. Therapeutic Procedures
    1. Thyroid
        a. Patient preparation and monitoring
        b. Treatment room preparation and monitoring
    2. Polycythemia vera
    3. Pain palliation
C. Indications
D. Acquisition or Delivery Techniques

IX. Overview of Nuclear Pharmacy

- A. Design and Daily Operation of a Nuclear Pharmacy
- B. Characteristics of Diagnostic and Therapeutic Radiopharmaceuticals
- C. Related Terminology

X. Radiopharmaceutical Production and Dose Calculations

- A. Reactors
- B. Accelerators
- C. Generators
- D. Dose Calculations
  1. Elapsed time
  2. Decay factors
  3. Activity concentration
  4. Volume determination

XI. Radiopharmaceutical Characteristics

- A. Specific Radiopharmaceuticals
- B. Clinical Use
- C. Physical Half-life and Energies
- D. General Information

XII. Radiopharmaceutical Quality Control

- A. Radionuclidic Purity
  1. Moly breakthrough test
  2. Moly limits
- B. Chemical Purity
  1. Alumina test
  2. Alumina limits
- C. Radiochemical Purity
  1. Free pertechnetate
  2. Hydrolyzed reduced technetium
- D. Particle Size

XIII. Update: New Procedures in Nuclear Medicine

- A. Monoclonal Antibodies
- B. Breast Scintigraphy
- C. New Pain Agents
- D. New Radiopharmaceuticals Used in Therapy

XIV. Radiation Biology

A. Direct and Indirect Theory of Radiation Damage
B. Radiosensitive, Radioresponsive and Radioresistant Organs and Systems
C. Somatic and Genetic Radiation Effects
D. Risk Versus Benefits of Medical Use of Radiation

XV. Nuclear Medicine Facilities

A. Department Personnel and Hierarchy
B. Department Layout
   1. Small facility
   2. Large facility
   3. Radiopharmacy
C. Interface with NRC

XVI. Quality Management Program & Misadministration (to be presented by NRC guest instructor)

XVII. Course Review, Examination, & Exam Critique

A. Course Review
B. Examination
C. Exam Critique

U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REGULATORY RESEARCH

DRAFT REGULATORY GUIDE

October 1994
Division 8
Task DG-8014

Contact: S. McGuire (301) 415-6204

DRAFT REGULATORY GUIDE DG-8014
(Proposed Revision 3 to Regulatory Guide 8.13)

INSTRUCTION CONCERNING PRENATAL RADIATION EXPOSURE

A. INTRODUCTION

Section 19.12, "Instructions to Workers," of 10 CFR Part 19, "Notices, Instructions and Reports to Workers: Inspection and Investigations," requires instruction in, among other things, the health protection problems associated with exposure to radioactive materials or radiation.

Section 20.1208 of 10 CFR Part 20, "Standards for Protection Against Radiation," requires licensees to "ensure that the dose to an embryo/fetus during the entire pregnancy, due to occupational exposure of a declared pregnant woman, does not exceed 0.5 rem (5 mSv)." The regulation also requires the licensee to make efforts to avoid substantial variation above a uniform monthly exposure rate to a declared pregnant woman. A declared pregnant woman is defined in 10 CFR 20.1003 as "a woman who has voluntarily informed her employer, in writing, of her pregnancy and the estimated date of conception."

The embryo/fetus is defined in 10 CFR 20.1003 as "the developing human organism from conception until the time of birth." The embryo is an early stage of development, before the individual limbs and organs are recognizable. In humans, this development takes about eight weeks. The organism is considered a fetus from that stage until birth.

This regulatory guide is being issued in draft form to involve the public in the early stages of the development of a regulatory position in this area. It has not received complete staff review and does not represent an official NRC staff position.

Public comments are being solicited on the draft guide (including any implementation schedule) and its associated regulatory analysis or value/impact statement. Comments should be accompanied by appropriate supporting data. Written comments may be submitted to the Regulatory Publications Branch, DFIPS, Office of Administration, U.S. Nuclear Regulatory Commission, Washington, DC 20555. Copies of comments received may be examined at the NRC Public Document Room, 2120 L Street NW., Washington, DC. Comments will be most helpful if received by March 17, 1995.

Requests for single copies of draft guides (which may be reproduced) or for placement on an automatic distribution list for single copies of future draft guides in specific divisions should be made in writing to the U.S. Nuclear Regulatory Commission, Washington, DC 20555, Attention: Office of Administration, Distribution and Mail Services Section.

Section 20.1502 of 10 CFR Part 20 specifies the requirements for monitoring for external and internal occupational dose to a declared pregnant woman. Licensees must monitor the external occupational dose to a declared pregnant woman, using an individual monitoring device, if it is likely that the embryo/fetus will receive, from sources external to the body of the declared pregnant woman, a dose in excess of 50 millirems (0.5 millisievert) during the pregnancy.

Licensees must also monitor, but not necessarily with individual monitoring devices, the occupational intake of radioactive material by declared pregnant women likely to receive, during the pregnancy, a committed effective dose equivalent in excess of 50 millirems (0.5 millisievert). For monitored declared pregnant women, the licensee must assess the effective dose equivalent delivered to the embryo/fetus during the pregnancy. Regulatory Guide 8.36, "Radiation Dose to the Embryo/Fetus,"* provides guidance on calculating the radiation dose to the embryo/fetus.

Section 20.2106 of 10 CFR Part 20 requires that the licensee maintain records of dose to an embryo/fetus if monitoring was required, and it requires that the records of the dose to the embryo/fetus be kept with the records of the dose to the declared pregnant woman. Regulatory Guide 8.7, "Instructions for Recording and Reporting Occupational Radiation Exposure Data,"* includes recommendations concerning records of dose to the embryo/fetus. That guide recommends that "Licensees should be sensitive to the issue of personal privacy with regard to embryo/fetus dose. If requested by the monitored woman, a letter report may be provided to subsequent licensees to document prior embryo/fetus dose." The declaration of pregnancy must also be kept on file but may be maintained separately from the dose records [10 CFR 20.2106(e)]. The licensee must retain each required form or record until the NRC terminates each pertinent license requiring the record.

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*Regulatory guides may be purchased at current rates from the U.S. Government Printing Office, Mail Stop SSOP, Washington, DC 20402-9328 (telephone (202)512-2249 or (202)512-2171); or from the National Technical Information Service by writing NTIS at 5285 Port Royal Road, Springfield, VA 22161. Regulatory guides are also available for inspection or copying for a fee from the NRC Public Document Room at 2120 L Street NW., Washington, DC; the PDR's mailing address is Mail Stop LL-6, Washington, DC 20555; telephone (202)634-3273; fax (202)634-3343.

Regulatory guides are issued to describe and make available to the public such information as methods acceptable to the NRC staff for implementing specific parts of the Commission's regulations, techniques used by the staff in evaluating specific problems or postulated accidents, and guidance to applicants. Regulatory guides are not substitutes for regulations, and compliance with regulatory guides is not required. Regulatory guides are issued in draft form for public comment to involve the public in the early stages of developing the regulatory positions. Draft regulatory guides have not received complete staff review and do not represent official NRC staff positions.

Any information collection activities mentioned in this regulatory guide are contained as requirements in 10 CFR Parts 19 or 20, which provide the regulatory bases for this guide. The information collection requirements in 10 CFR Parts 19 and 20 have been cleared under OMB Clearance Nos. 3150-0044 and 3150-0014, respectively.

B. DISCUSSION

This guide is being developed to provide guidance to licensees on instructions that must be provided concerning prenatal radiation exposure. In particular, the instructions described in this guide are intended to provide the information needed by women who become pregnant to help them make an informed decision on whether or not to formally declare their pregnancy in accordance with regulations.

C. REGULATORY POSITION

1. WHO SHOULD RECEIVE INSTRUCTION

Instruction concerning prenatal radiation exposure and its risks to the embryo/fetus should be provided to workers before they are allowed to work in a restricted area. Each supervisor of a female worker who will work in a restricted area should also receive the instruction.

2. HOW TO PROVIDE INSTRUCTION

The instruction should be presented both orally and in written form and should include, as a minimum, the information in the Appendix to this guide. Each worker should be given a copy of this guide. Workers should be given the opportunity to ask questions on the instructions.

3. EMPLOYER'S POLICY ON DECLARED PREGNANT WOMEN

The instruction provided should describe the employer's specific policy on declared pregnant women. In particular, the instruction should include a description of the employer's policies with respect to changes, if any, that may affect the declared pregnant woman's work situation as a result of her filing a written declaration of pregnancy consistent with 10 CFR Part 20.

4. DURATION OF LOWER DOSE LIMITS FOR EMBRYO/FETUS

The lower dose limit is in effect until the declared pregnant woman (1) is known to have given birth, (2) informs the licensee that she is no longer pregnant, or (3) informs the licensee that she no longer wants to be considered a declared pregnant woman.

D. IMPLEMENTATION

The purpose of this section is to provide information to applicants regarding the NRC staff's plans for using this regulatory guide.

This proposed revision has been released to encourage public participation in its development. Except in those cases in which an applicant proposes an acceptable alternative method for complying with specified portions of the NRC's regulations, the method to be described in the active guide reflecting public comments will be used in the evaluation of the instructions to workers on radiation exposure of pregnant women.

APPENDIX

INSTRUCTIONS CONCERNING PREGNANT WOMEN

Regulations require that licensees instruct individuals working with licensed radioactive materials in radiation protection as appropriate for the situation. This Appendix describes information that you should know about the radiation exposure of pregnant women. In particular, radiation protection regulations allow a pregnant woman to decide whether she wants to formally declare her pregnancy to her employer, thereby taking advantage of the special dose limits provided to protect the developing embryo/fetus. This Appendix provides information on the potential effects of declaring a pregnancy in order to help women make informed decisions on whether or not to declare pregnancy. The information is provided in the form of answers to a woman's questions.

MAKING THE DECISION TO DECLARE PREGNANCY

1. If I become pregnant, am I required to inform my employer of my pregnancy?

No. It is your choice whether to declare your pregnancy to your employer. If you choose to declare your pregnancy, a lower radiation dose limit will apply to you. If you choose not to declare your pregnancy, you will continue to be subject to the same radiation dose limits that apply to nonpregnant workers even if you are visibly pregnant.

2. If I inform my employer in writing of my pregnancy, what happens?

The amount of radiation that you will be allowed to receive will decrease because there is a lower dose limit for the embryo/fetus of female workers who have formally declared their pregnancy in writing. Ordinarily, the radiation dose limit for a worker is 5 rems (50 millisieverts) in a year.

But if you declare in writing that you are pregnant, the dose to the embryo/fetus is generally limited to 0.5 rem (5 millisieverts) during the 9-month pregnancy, which is one-tenth of the dose limit that an adult worker may receive in a year. In addition, licensees must make efforts to avoid substantial variation above a uniform monthly dose rate so that all the dose received does not occur during a particular time of the pregnancy. This may mean that, if you declare your pregnancy, you may not be permitted to perform some of your normal job functions and you may not be able to have emergency response responsibilities.

3. Why do the regulations have a lower dose limit for a woman who has declared her pregnancy than for a normal worker?

The purpose of the lower limit is to protect her unborn child. Scientific advisory groups recommend (References 1 and 2) that the dose before birth be limited to about 0.5 rem rather than the 5-rem (50-millisievert) occupational annual dose 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.

4. What effects on development can be caused by radiation exposure?

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.

For example, studies of the effects of radiation on animals and humans demonstrate clearly and conclusively that large doses of radiation -- such as 100 rems (1 sievert) -- cause serious developmental defects in many of the body's organs when the radiation is delivered during the period of rapid organ development (References 2, 3, 4, and 5).

The developing human brain has been shown to be especially sensitive to radiation. Mental retardation has been observed in the survivors of the atomic bombings in Japan exposed *in utero* during sensitive periods.

Additionally, some other groups exposed to radiation *in utero* have shown lower than average intelligence scores and poor performance in school (Reference 4).

The sensitivity of the brain undoubtedly reflects its structural complexity and its long developmental period (and hence long sensitive period). The most sensitive period is during about the 8th to 15th weeks of gestation followed by a substantially less sensitive period for the 2 months after the 15th week (Reference 4). There is no known effect on the child's developing brain during the first two months of pregnancy or the last three months of pregnancy (Reference 4).

No developmental effects caused by radiation have been observed in human groups at doses at or below the 5-rem (50-millisievert) occupational dose limit. Scientists are uncertain whether there are developmental effects at doses below 5 rems (50 millisieverts). 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. Or, it may be that there is 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 rems (50 millisieverts), scientific advisory groups consider it prudent to limit the dose to the embryo/fetus to 0.5 rem (5 millisieverts) (References 1 and 2). At doses greater than 5 rems (50 millisieverts), such as might be received during an accident or during emergency response activities, the possibility of developmental effects increases.

5. How much will the likelihood of cancer be increased?

Radiation exposure has been found to increase the likelihood of cancer in many studies of adult human and animal groups. At doses below the occupational dose limit, an increase in cancer incidence has not been proven, but is presumed to exist even if it is too small to be measured. The question here is whether the embryo/fetus is more sensitive to radiation than an adult.

While 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 (Reference 1). If this is true, there would be 1 radiation-induced cancer death in 200 people exposed *in utero* at the occupational dose limit of 5 rems (50 millisieverts) (Reference 1). Scientific advisory groups have considered this risk to be too high and have thus recommended that the radiation dose to the embryo/fetus be limited to a maximum of 0.5 rem (5 millisieverts). At that dose, there would be 1 radiation-induced cancer death per 2000 people. This would be in addition to the 400 cancer deaths from all causes that one would normally expect in a group of 2000 people.

6. How does the risk to the embryo/fetus from occupational radiation exposure compare to other avoidable risks?

The risk to the embryo/fetus from 0.5 rem or even 5 rems of radiation exposure is relatively small compared to some other avoidable risks.

Of particular concern is excessive consumption of alcohol during pregnancy. The U.S. Public Health Service has concluded that heavy alcohol consumption during pregnancy (three drinks per day and above) is the leading known cause of mental retardation (Reference 6). Children whose mothers drank heavily during pregnancy may exhibit developmental problems such as hyperactivity, distractibility, short attention spans, language difficulties, and delayed maturation, even when their intelligence is normal.

In studies tracking the development of children born to light or moderate drinkers, researchers have also correlated their mothers' drinking patterns during pregnancy with low birth weight, decreased attention spans, delayed reaction times, and lower IQ scores at age 4 years. Youngsters whose mothers averaged three drinks per day during pregnancy were likely to have IQs averaging 5 points lower than normal.

Cigarette smoking may also harm the unborn (Reference 6). There is a direct correlation between the amount of smoking during pregnancy and the frequency of spontaneous abortion and fetal death. Children of mothers who smoke while pregnant are more likely to have impaired intellectual and physical growth. Maternal smoking has also been associated with such behavioral problems in offspring as lack of self-control, irritability,

hyperactivity, and disinterest. Long-term studies indicate that these children perform less well than matched youngsters of nonsmokers on tests of cognitive, psychomotor, language, and general academic functioning.

Alcohol and smoking are only examples of other risks in pregnancy. Many other toxic agents and drugs also present risk. In addition, many factors that cannot be controlled present risk. There is an increased risk in pregnancy with increasing maternal age. Maternal disease may be an important risk factor. Malnutrition, toxemia, and congenital rubella may be associated with birth defects. Maternal diabetes and high blood pressure have been associated with problems in the newborn. In addition, many birth defects and developmental problems occur without an obvious cause and without any obvious risk factors. For example, viruses that we may not even be aware of can cause defects, and defects can arise from spontaneous random errors in cell reproduction. But these are things that we can't do anything about.

In summary, you are advised to keep radiation exposure of your unborn child below 0.5 rem, but you should also remember that alcohol consumption, cigarette smoking, and the use of other drugs can do a great deal of harm.

7. What if I decide that I do not want any radiation exposure at all during my pregnancy?

You may ask your employer for a job that does not involve any exposure to occupational radiation at all, but your employer may not have such a position or may not be willing to provide you with a job involving no radiation exposure. Even if you receive no occupational exposure at all, you will receive a dose typically about 0.3 rem (3 millisieverts) from unavoidable natural background radiation (Reference 7).

8. What effect will formally declaring my pregnancy have on my job status?

Only your employer can tell you what effect a declaration of pregnancy will have on your job status. As part of your radiation safety training, your employer should tell you its policies with respect to the job status of declared pregnant women. In addition, we recommend that, before you declare

your pregnancy, you talk to your employer and ask what a declaration of pregnancy would mean specifically for you and your job status. However, if you do not declare your pregnancy, the lower exposure limit of 0.5 rem (5 millisieverts) does not apply.

It is most likely that your employer will tell you that you can continue to perform your job with no changes and still meet the NRC's limit for exposure to declared pregnant women. A large majority of licensee employees (greater than 90%) receive, in 9 months, occupational radiation doses that are below the 0.5-rem (5-millisievert) limit for a declared pregnant woman.

If the dose you currently receive is above the 0.5-rem (5-millisievert) dose allowed for a declared pregnant woman, it is quite likely that your employer can and will make a reasonable accommodation that will allow you to continue performing your current job, for example, by having another qualified employee perform a small part of the job that accounts for much of the radiation exposure.

On the other hand, it is possible, although not common, that your employer will conclude that there is no reasonable accommodation that can be made without undue hardship that would allow you to do your job and remain within the dose limits for a declared pregnant woman. In these few instances, your employer may conclude that you can no longer be permitted to do your current job, that you must be removed from your job, and that there is no other job available for someone with your training and job skills.

If your employer concludes that you must be removed from your current job in order to comply with the lower dose limits for declared pregnant women, you may be concerned about what will happen to you and your job. The answer to that depends on your particular situation. That is why you should talk to your employer about your particular situation. In addition, telephone numbers that may be useful for obtaining information are listed in response to question 20 in this guide.

HOW TO DECLARE YOUR PREGNANCY

9. What information must I provide in my declaration of pregnancy?

You must provide your name, a declaration that you are pregnant, the estimated date of conception (only the month and year need be given), and the date that you give the letter to your employer. A sample form letter that you can use is included at the end of these questions and answers. You may use that letter or write your own letter.

10. To declare my pregnancy, do I have to have documented medical proof that I am pregnant?

No. No proof is necessary.

11. Can I tell my employer orally rather than in writing that I am pregnant?

No, the declaration must be in writing. As far as the regulations are concerned, an oral declaration or statement is the same as not telling your employer that you are pregnant.

12. If I have not declared my pregnancy in writing, but my employer notices that I am pregnant, do the lower dose limits apply?

No. The lower dose limits for pregnant women apply only if you have declared your pregnancy in writing. The choice of whether to declare your pregnancy and thereby work under the lower dose limits is your choice, not your employer's. Your employer may not remove you from a specific job because you appear pregnant.

13. If I am planning to become pregnant but am not yet pregnant, and I inform my employer of that in writing, do the lower dose limits apply?

No. The lower limits apply only if you declare that you are already pregnant.

14. What if I have a miscarriage or find out I am not pregnant?

If you have declared your pregnancy in writing, you should promptly inform your employer that you are no longer pregnant. The regulations do not require that the revocation of a declaration be in writing, but we recommend that you revoke the declaration in writing to avoid confusion. Also, your employer may insist upon a written revocation for its own protection. If you have not declared your pregnancy, there is no need to inform your employer of your new, nonpregnant status.

If you have a miscarriage and become pregnant again before you have revoked your original declaration of pregnancy, you should submit a new declaration of pregnancy because the date of conception has changed.

15. How long is the lower dose limit in effect?

The dose to the embryo/fetus must be limited until (1) your employer knows you have given birth, (2) you inform your employer that you are no longer pregnant, or (3) you inform your employer that you no longer wish to be considered pregnant.

16. If I have declared my pregnancy in writing, can I revoke my declaration of pregnancy even if I am still pregnant?

Yes, you may. The choice is entirely yours. If you revoke your declaration of pregnancy, the lower dose limits no longer apply.

17. What if I work under contract at the licensed facility and my employer is not the licensee?

The regulations state that you should formally declare your pregnancy to your employer in writing. You can ask your employer to give a copy of your declaration to the licensee, or you may give a copy of your written declaration directly to the licensee.

18. Can I tell my employer I am pregnant when I know I am not in order to work under the lower dose limits?

The purpose of the NRC regulations is to allow a pregnant woman to choose a heightened level of protection from radiation exposure for the embryo/fetus during her pregnancy. That purpose would not be served by intentionally declaring yourself to be a pregnant woman when you know you are not pregnant. There are no NRC regulatory requirements specifically addressing the actions your employer might take if you provide a false declaration. However, nothing in NRC regulations would prevent your employer from taking action against you for deliberately lying.

STEPS TO LOWER RADIATION DOSE

19. What steps can I take to lower my radiation dose?

Your employer should already have explained that to you as part of the instructions that licensees must give to all workers. However, you should ask your supervisor or the radiation safety officer whether any additional steps can be taken.

The general principles for maintaining exposure to radiation as low as reasonably achievable are summarized below. You should already be applying these principles to your job, but now is a good time to review them.

External Radiation Exposure: External radiation is radiation you receive from radiation sources or radioactive materials that are outside your

body. The basic principles for reducing external radiation exposure are time, distance, and shielding -- decrease your time near radiation sources, increase your distance from radiation sources, and increase the shielding between yourself and the radiation source. You should work quickly and efficiently in a radiation area so that you are not exposed to the radiation any longer than necessary. As the distance is increased from the source of radiation, the dose decreases. When possible, you should work behind shielding. The shielding will absorb some of the radiation, thus reducing the amount that reaches you.

Internal Radiation Exposure: Internal radiation is radiation you receive from radioactive materials that have gotten into your body, generally entering with the air you breathe, the food you eat, or the water you drink. Your employer will have specific procedures to minimize internal radiation exposure. Those procedures probably incorporate the following general precautions that should be taken when you are working with radioactive materials that are not encapsulated:

1. Wear lab coats or other protective clothing if there is a possibility of spills.

2. Use gloves while handling unencapsulated radioactive materials.

3. Wash hands after working with unencapsulated radioactive materials.

4. Do not eat, drink, smoke, or apply cosmetics in areas with unencapsulated radioactive material.

5. Do not pipette radioactive solutions by mouth.

These basic principles should be incorporated into the specific methods and procedures for doing your individual work. Your employer should have trained you in those specific rules and procedures.

If you become pregnant, it is a good time to review the training materials on the methods and procedures that you were provided in your training. You can also talk to your supervisor about getting refresher training on how to keep radiation doses as low as reasonably achievable.

ADDITIONAL INFORMATION

20. Where can I get additional information?

You can find additional information on the risks of radiation in NRC's Regulatory Guide 8.29, "Instruction Concerning Risks from Occupational Radiation Exposure."

You can also telephone the NRC Regional Offices at the following numbers: Region I - (610) 337-5000; Region II - (404) 331-4503; Region III - (708) 829-9500; and Region IV - (817) 860-8100. Legal questions should be directed to the Regional Counsel, and technical questions should be directed to the Division of Radiation Safety and Safeguards.

If you believe you have been discriminated against, you should contact the U.S. Equal Employment Opportunity Commission (EEOC), 1801 L Street NW., Washington, DC 20507, or an EEOC Field Office by calling (800) 669-4000 or (800) 669-EEOC. For individuals with hearing impairments, the EEOC's TDD number is (800) 800-3302.

REFERENCES

1. National Council on Radiological Protection and Measurements, *Limitation of Exposure to Ionizing Radiation*, Report No. 116, Bethesda, MD, 1993. [The National Council on Radiological Protection and Measurements (NCRP) is a nonprofit corporation chartered by Congress in 1964 to collect information and make recommendations on protection against radiation. This publication, on pages 37-39, summarizes the conclusions of the NCRP with respect to protection of the human embryo/fetus against radiation. This publication should be available through most good public library systems and most good university libraries. Your employer may also have a copy.]

2. *ICRP Publication 60 -- 1990 Recommendations of the International Commission on Radiological Protection, Ann. ICRP 21*:No. 1-3, Pergamon Press, 1991. [This publication, on pages 146-149, summarizes the conclusions of the ICRP on the effects of radiation on the human embryo/fetus.]

3. *Health Effects of Exposure to Low Levels of Ionizing Radiation (BEIR V)*, Committee on the Biological Effects of Ionizing Radiations, National Research Council, National Academy Press, Washington, DC, 1990.

4. United Nations Scientific Committee on the Effects of Atomic Radiation, *Sources and Effects of Ionizing Radiation*, United Nations, New York, 1993.

5. National Council on Radiation Protection and Measurements, *Considerations Regarding the Unintended Radiation Exposure of the Embryo, Fetus, or Nursing Child*, NCRP Commentary No. 9, National Council on Radiation Protection and Measurements, Bethesda, MD, 1994.

6. *Alcohol, Tobacco, and Other Drugs May Harm the Unborn*, U.S. Department of Health and Human Services, Public Health Service, Alcohol, Drug Abuse,

and Mental Health Administration, DHHS Publication No. (ADM)92-1711, Rockville, Maryland, 1990.

7. National Council on Radiological Protection and Measurements, *Exposure of the Population in the United States and Canada from Natural Background Radiation*, Report No. 94, Bethesda, MD, 1987.

FORM LETTER FOR DECLARING PREGNANCY

This form letter is provided for your convenience. To make your declaration of pregnancy, you may fill in the blanks in this form letter and give it to your employer or you may write your own letter.

DECLARATION OF PREGNANCY

To: _____
(Name of your supervisor or other employer representative)

I am declaring that I am pregnant. I believe I became pregnant in _____, _____ (only the month and year need be provided).

I understand that my occupational radiation dose during my entire pregnancy will not be allowed to exceed 0.5 rem (5 millisieverts) (unless that dose has already been exceeded between the time of conception and submitting this letter). I also understand that meeting the lower dose limit may require a change in job or job responsibilities during my pregnancy.

If I find out that I am not pregnant, or if my pregnancy is terminated, I will promptly inform you in writing that my pregnancy has ended. (This promise to inform your employer in writing when your pregnancy has ended is optional. The sentence may be crossed out if you wish.)

_____
(Your signature)

_____
(Your name printed)

_____
(Date)

REGULATORY ANALYSIS

A separate regulatory analysis was not prepared for this regulatory guide. A regulatory analysis prepared for 10 CFR Part 20, "Standards for Protection Against Radiation" (56 FR 23360), provides the regulatory basis for this guide and examines the costs and benefits of the rule as implemented by the guide. A copy of the "Regulatory Analysis for the Revision of 10 CFR Part 20" (PNL-6712, November 1988) is available for inspection and copying for a fee at the NRC Public Document Room, 2120 L Street NW., Washington, DC, as an enclosure to Part 20 (56 FR 23360).

FAX INFORMATION

U. S. NUCLEAR REGULATORY COMMISSION
OFFICE OF STATE PROGRAMS
MAIL STOP 3 D 23
WASHINGTON, D.C. 20555

STATE PROGRAMS FAX: (301) 415-3502
USNRC MAIN FAX: (301) 415-2260/1137/2259

NUMBER OF PAGES: 28 including this page

DATE: APRIL 10, 1996

TO: RADIATION CONTROL PROGRAM DIRECTORS IN
ALL AGREEMENT STATES, MASSACHUSETTS, OHIO, OKLAHOMA, PENNSYLVANIA

NRC REGIONAL STATE AGREEMENTS OFFICERS
NRC REGIONAL STATE LIAISON OFFICERS

FROM: PAUL H. LOHAUS, DEPUTY DIRECTOR
OFFICE OF STATE PROGRAMS

SUBJECT: SP-96-045 DIAGNOSTIC & THERAPEUTIC
NUCLEAR MEDICINE FOR NRC INSPECTORS COURSE

VERIFICATION NO.: 301-415-3340

< TRANSACTION REPORT >

04-10-1996(WED) 16:48

[BROADCAST]

NO.	DATE	TIME	DESTINATION STATION	PG.	DURATION	MODE	RESULT
26411	4-10	15:58	PENNSYLVANIA	28	0°11'17"	NORM.E	OK
26412		16:10	405 271 8425	28	0°11'04"	NORM.E	OK
26413		16:21	617 727 2098	28	0°13'23"	NORM.E	OK
26414		16:37	OHIO	28	0°11'12"	NORM.E	OK
				112	0°46'56"		

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04-10-1996(WED) 15:38

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153858	BROADCAST	4-10 15:38	18:15	RG
				RGNII
				RGNIII
				RGNIV
				RIV/WC
				ALABAMA
				ARIZONA
				ARKANSAS
				CALIFORNIA
				COLORADO
				FLORIDA
				GEORGIA
				ILLINOIS RCP 1
				IOWA
				KANSAS
				KENTUCKY
				LOUISIANA
				MAINE
				MARYLAND
				MISSISSIPPI
				NEBRASKA
				NEVADA
				NEW HAMPSHIRE
				NEW MEXI
				NEW YORK DEPT HEALTH
				NORTH CAROLINA
				NORTH DAKOTA
				OREGON
				RHODE ISLAND
				SC RCP
				TENNESSEE
				TEXAS RCP
				UTAH
				WASHINGTON
				NEW YORK DEPT ENVIR
				NEW YORK LABOR
				NEW YORK CITY
				CRCPD
				AECB CANADA
				WASHINGTON DC
				SC WASTE SECTION
				IL RCP 2 (KERR)
				TX NATURAL RESOUCES
				NE DEC
				GA SE REGION

< TRANSACTION REPORT >

04-11-1996(THU) 00:45

[BROADCAST]

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26415	4-10	18:15	610 337 5324	28	0°11'19"	NORM.E	OK
26416		18:26	9403333 RII - will resend by RIDS	15	0°11'15"	NORMAL	U010
26417		18:38	708 515 1259	28	0°22'19"	NORM.E	OK
26418		19:00	817 860 8122 - RIV " " "	12	0°06'24"	NORM.E	U010
26419		19:07	5109750381	28	0°11'23"	NORM.E	OK
26420		19:19	334 613 5387	28	0°20'43"	NORM.E	OK
26421		19:40	6024370705	28	0°16'30"	NORMAL	OK
26422		19:57	ARKANSAS	28	0°11'35"	NORM.E	OK
26423		20:09	0111916 3243610	28	0°11'10"	NORM.E	OK
26424		20:20	303 782 5083	28	0°12'29"	NORM.E	OK
26425		20:33	904 487 0435	28	0°11'19"	NORM.E	OK
26426		20:45	404 362 2653	28	0°35'15"	NORM.E	OK
26427		21:20	217 524 4724	28	0°11'06"	NORM.E	OK
26428		21:32	515 242 6284	28	0°11'19"	NORM.E	OK
26429		21:43	913 296 0984	28	0°12'12"	NORM.E	OK
26430		21:56	502 564 6533	28	0°11'19"	NORM.E	OK
26431		22:07	LOUISIANA (25)	16	0°10'00"	NORM.E	U010
26432		22:18	MAINE	28	0°15'56"	NORMAL	OK
26433		22:34	94106313198	28	0°16'01"	NORMAL	OK
26434		22:50	601+354+6167	28	0°17'23"	NORMAL	OK
26435		23:08	402 471 0383	28	0°11'09"	NORM.E	OK
26436		23:20	7026875751	28	0°17'22"	NORMAL	OK
26437		23:39	5058271544	28	0°16'00"	NORMAL	OK
26438		23:55	518 456 6434	28	0°11'21"	NORM.E	OK
26439	4-11	00:07	919 571 4148	28	0°38'43"	NORM.E	OK
				659	6°21'32"		

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26440	4-11	00:46	701 328 5200	28	0°11'08"	NORM.E	OK
26441		00:58	503 731 4081	28	0°11'09"	NORM.E	OK
26442		01:09	401 277 6953	28	0°11'19"	NORM.E	OK
26443		01:21	803 737 7412	28	0°11'22"	NORM.E	OK
26444		01:32	615-532-7938	28	0°14'23"	NORMAL	OK
26445		01:47	512 834 6708	28	0°11'16"	NORM.E	OK
26446		01:59	801 533 4097	28	0°13'41"	NORM.E	OK
26447		02:13	1 206 753 1496	28	0°12'34"	NORMAL	OK
26448		02:26	518 457 2225	28	0°11'28"	NORM.E	OK
26449		02:37	518 457 5545 (62)	14	0°08'45"	NORM.E	U010
26450		02:48	502 227 7862	28	0°12'50"	NORMAL	OK
26451		03:01	AECB (613) 995-5086	28	0°12'32"	NORMAL	OK
26452		03:14	202 727 7780	28	0°11'06"	NORM.E	OK
26453		03:25	7996726	28	0°11'09"	NORM.E	OK
26454		03:37	217 782 1328	28	0°13'35"	NORM.E	OK
26455		03:51	512 239 6383	28	0°11'17"	NORM.E	OK
26456		04:02	402 471 2909	28	0°11'22"	NORM.E	OK
26457		04:14	GA SE REGION (12) OK 4/11	15	0°09'05"	NORMAL	U008
			ERROR PAGE:12 13 14 15				
26458		04:35	NEW HAMPSHIRE (39)	0			U000
26459		04:37	NEW YORK CITY (63) - marked 4/11	0			U000
				477	3°30'01"		

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04-11-1996(THU) 11:55

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26464	4-11	11:13	LOUISIANA OK 4/11	3	0°01'53"	NORM.E	U010
26465		11:16	GA SE REGION	28	0°13'37"	NORMAL	OK
26466		11:33	518 457 5545 - OK 4/11	14	0°08'45"	NORM.E	U010
26467		11:54	NEW HAMPSHIRE - 4/11. OK	0			U000
26468		11:55	NEW YORK CITY - mailed (fax not working)	0			U000
				45	0°24'15"		

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04-11-1996(THU) 13:13

[TRANSMIT]

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26472	4-11	13:05	518 457 5545	16	0°08'21"	NORM.E	U050
			DDL - Rec'd. 15 pages this is last of pkg.	16	0°08'21"		

WRONG PAGE COUNT.

< TRANSACTION REPORT >

04-11-1996(THU) 16:38

[TRANSMIT]

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26481	4-11	16:21	LOUISIANA	28	0°17'23"	NORM.E	OK
			Louisiana	28	0°17'23"		

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[TRANSMIT]

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26478	4-11	15:32	603 271 3745 OK New Hampshire	27	0°11'29"	NORM.E	U050
				27	0°11'29"		

WRONG PAGE COUNT.