

## RISKS ASSOCIATED WITH RADIATION EXPOSURE

Many researchers feel that any exposure to ionizing radiation, no matter how small the dose, increases the risk of developing cancer or of passing on genetic mutations to future offspring.

It is scientifically established that exposure to radiation increases the risk of damage to tissues, cells, DNA and other vital molecules — potentially causing programmed cell death (apoptosis), genetic mutations, cancers, leukemia, birth defects, and reproductive, immune, circulatory, and endocrine system disorders.

The long latency period between exposure to radiation and evidence of cancer or other health effects can make it very difficult to prove the cause. Any exposure to radiation increases a person's risk.

For these reasons — for your health and your family's health — try to be aware of your **risks**, your **rights**, and your **cumulative history** of radiation exposure.

## PROTECTION FOR ALL WORKERS

Your rights apply whether you are a temporary or long-term employee. Your employer is responsible for protecting you from levels of internal and external radiation that are higher than the permissible federal standards. Please note: **“permissible” does not mean safe.**

## PERSONAL PROTECTIVE EQUIPMENT

### Clothing:

Today, workers usually wear plastic and/or cloth cover garments. These garments only protect against radioactive dust, not against hot particles or other penetrating radiation.

### Respirators:

The nuclear industry and government regulations often allow employees to work in contaminated areas without a respirator. Their theory is that if you don't wear a respirator, you can work more efficiently and therefore complete a task with a shorter exposure to radiation. Without an appropriate respirator, however, a worker can inhale or swallow large amounts of airborne radioactive gases and vapors, as well as radioactive particles, that can become lodged in the body and can continue to irradiate nearby cells and organs.

Instead of permitting workers to work without respirator protection, even for a shorter period of time, employers should hire more workers — **all wearing respirators** — to do the work.

NRC regulations say: “The licensee shall advise each respirator user that the user may leave the area at any time for relief from respirator use in the event of equipment malfunction, physical or psychological distress, procedural or communication failure, significant deterioration of operating conditions, or any other conditions that might require such relief.” (Code of Federal Regulations [cfr], Title 10, Part 20, Section 1703. See also the rest of Subpart H, and Appendix A attached to the last section of Part 20.) See also, NRC **Regulatory Guide** 8.15, “Acceptable Programs for Respiratory Protection,” Revision 1. Also, NRC's **NUREG/CR-0041** “Manual of Respiratory Protection Against Airborne Radioactive Material,” Revision 1, (ML010310331).

Internet location for NRC documents:  
<http://www.nrc.gov/reading-rm/doc-collections/>

then add:  
**forms** or **reg-guides** or **cfr**  
depending on the kind of document.

Internet location for NRC's NUREG documents:  
<http://www.nrc.gov/reading-rm/adams/web-based.html>. Then click on “Begin ADAMS Search” and enter the “ML” number.

## FOR FURTHER INFORMATION

If you have questions about your exposure to radiation on the job, you can contact:

U.S. Nuclear Regulatory Commission

Office of Inspector General  
Washington, D.C. 20555

Confidential Hotline: 1-800-233-3497

If you have questions about your legal rights to raise worker health and safety issues, you can contact:

Government Accountability Project

• 1612 K Street N.W. – Suite 1100  
Washington, D.C. 20006  
202-408-0034

• West Coast Office  
1511 Third Avenue – Suite 321  
Seattle, WA 98101

If you believe you have been retaliated against for raising worker health and safety concerns, be sure to act quickly. Many whistleblower laws require that you file a complaint within 30 days after the retaliation occurred.

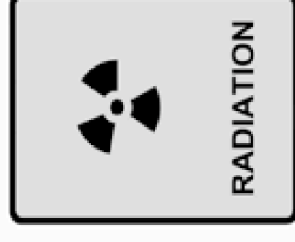


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# YOUR NUCLEAR WORKPLACE



# KNOW YOUR RISKS

# KNOW YOUR RIGHTS

Nuclear Information & Resource Service  
World Information Service on Energy - Amsterdam

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Takoma Park, MD 20912  
301-270-6477 • [nirsnet@nirs.org](mailto:nirsnet@nirs.org)  
[www.nirs.org](http://www.nirs.org) • [www.antenna.nl/wise](http://www.antenna.nl/wise)

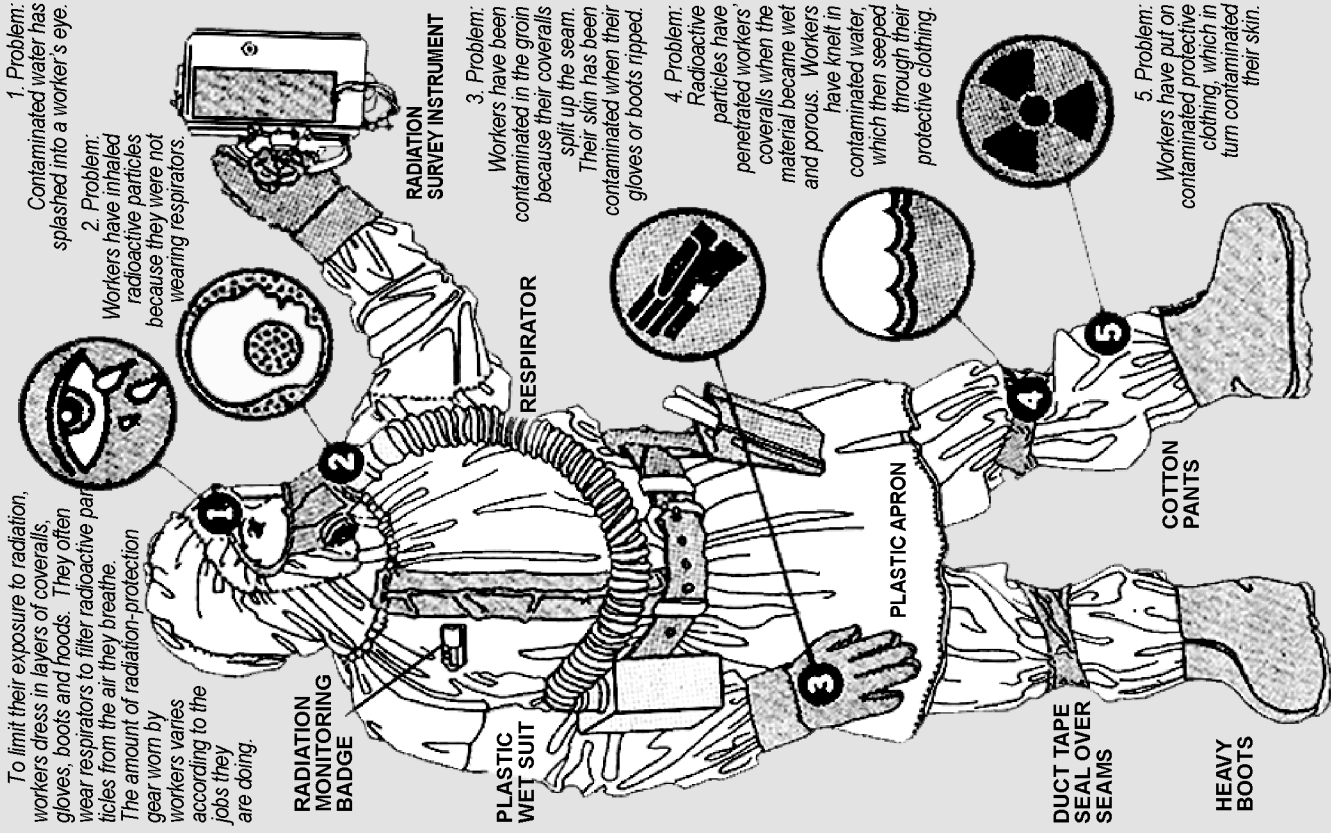
April 2006

# WORKER PROTECTION

To limit their exposure to radiation, workers dress in layers of coveralls, gloves, boots and hoods. They often wear respirators to filter radioactive particles from the air they breathe. The amount of radiation-protection gear worn by workers varies according to the jobs they are doing.

1. Problem: Contaminated water has splashed into a worker's eye.

2. Problem: Workers have inhaled radioactive particles because they were not wearing respirators.



RADIATION MONITORING BADGE

PLASTIC WET SUIT

RESPIRATOR

RADIATION SURVEY INSTRUMENT

PLASTIC APRON

DUCT TAPE SEAL OVER SEAMS

COTTON PANTS

HEAVY BOOTS

# As a nuclear worker, you have a right . . .

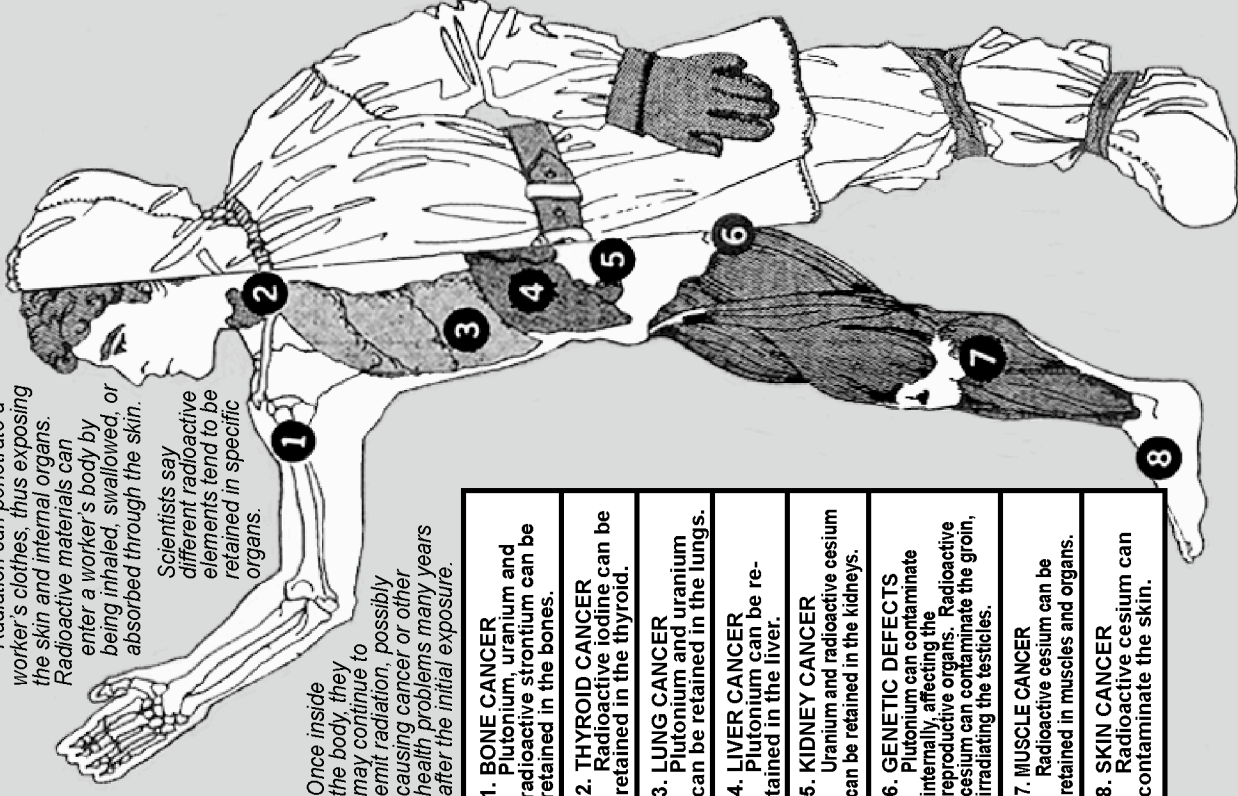
- to be issued the proper kind of monitor for the types of radiation to which you may be exposed — alpha, beta, gamma and neutron;
- to be adequately trained in the use of your radiation badge, dosimeter, or computerized detector. Multiple badges may be required to track doses to different parts of your body when working in a non-uniform area. (See NRC Regulatory Guide 8.34 on monitoring and calculating dose);
- to know that your personnel dosimeter equipment and other health physics monitoring equipment are functioning properly. The dosimeter processor must be accredited;
- to be informed of the amounts and kinds of radiation to which you are allowed to be exposed, not only during normal working hours, but also during “planned special exposures”;
- to be taught the best possible techniques for preventing or reducing radiation exposure, including the use of shielding;
- to know the radioactivity levels of any equipment or materials you might use, repair, replace, or move — as well as the levels (“radiation fields”) in your work area;
- to be supplied with clean, undamaged clothing and to be instructed in the safest way to remove protective clothing that may have become contaminated;
- to know the contents of your individual radiation monitoring records, both for each monitoring period (NRC Form 5) and for your lifetime Cumulative Occupational Dose History (NRC Form 4). Each NRC-licensed facility must maintain these records for the duration of its license. (See Code of Federal Regulations [cfr], Title 10, Part 20, Subpart L; and NRC Regulatory Guide 8.7, Revision 2, on exposure records and reports).

# SOME WAYS WORKERS CAN BE EXPOSED TO RADIATION:

Radiation can penetrate a worker's clothes, thus exposing the skin and internal organs. Radioactive materials can enter a worker's body by being inhaled, swallowed, or absorbed through the skin.

Scientists say different radioactive elements tend to be retained in specific organs.

Once inside the body, they may continue to emit radiation, possibly causing cancer or other health problems many years after the initial exposure.



1. <b>BONE CANCER</b> Plutonium, uranium and radioactive strontium can be retained in the bones.
2. <b>THYROID CANCER</b> Radioactive iodine can be retained in the thyroid.
3. <b>LUNG CANCER</b> Plutonium and uranium can be retained in the lungs.
4. <b>LIVER CANCER</b> Plutonium can be retained in the liver.
5. <b>KIDNEY CANCER</b> Uranium and radioactive cesium can be retained in the kidneys.
6. <b>GENETIC DEFECTS</b> Plutonium can contaminate internally affecting the reproductive organs. Radioactive cesium can contaminate the groin, irradiating the testicles.
7. <b>MUSCLE CANCER</b> Radioactive cesium can be retained in muscles and organs.
8. <b>SKIN CANCER</b> Radioactive cesium can contaminate the skin.

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# . . . and SOME PROBLEMS.