

# **Pantex** INFO

## **Radiation Facts**

**T**he National Nuclear Security Administration and B&W Pantex are strongly committed to a radiation safety program that keeps personnel exposure to radiation and radioactive materials as low as reasonably achievable (ALARA). As a result, Pantex radiation occupational exposure levels compare favorably with those of any major DOE/NNSA site that is still performing weapons-related missions.

Exposure to radiation is measured in units of rem or millirem. A millirem (mrem) is one-thousandth of a rem.

The DOE annual federal limit for occupational dose of radiation is 5,000 millirem. However, Pantex restricts exposure for most personnel to a lower administrative control level (ACL) of 200 millirem per year. Workers in some operations are allowed a higher ACL.

To put this in perspective, the average annual radiation dose from naturally occurring and manmade sources to a person living in this area is about 620 millirem per year.

### **Radiation versus Contamination**

Ionizing radiation includes alpha particles, beta particles, gamma rays, X-rays, neutrons, high-speed electrons, high-speed protons and other particles capable of producing ions. It does not include non-ionizing radiation, such as radio waves and microwaves, or visible, infrared or ultraviolet light.

Contamination is radioactive material in any place where it is not desired. At Pantex, careful monitoring ensures that contamination is recognized and controls are implemented to prevent personnel exposure, to the maximum extent possible. B&W Pantex Radiation Safety Department (RSD) personnel routinely monitor work and casual areas to ensure radioactive contamination is properly controlled. Contamination is not normally a personnel exposure concern unless the radioactive material enters the body through ingestion, inhalation, absorption or injection (a wound).

### **ALARA (As Low As Reasonably Achievable) Program**

Radiation doses are minimized through implementation of a highly effective ALARA program. Elements of the ALARA program include the use of engineering controls, such as vent hoods, particulate capturing systems and shielding, and

administrative controls, such as worker training. These controls help keep exposures to a minimum. In addition, the ALARA program establishes aggressive radiation dose administrative control levels that challenge managers to maintain personnel doses as low as reasonably achievable.

### **Workplace Monitoring**

Sophisticated instruments are used throughout the site for monitoring radiation levels and detecting contamination. Continuous air monitors can detect the unlikely airborne release of radioactive materials. Portable instruments are also used to monitor radiation levels and detect contamination, if present.

### **Personnel Monitoring and Protection**

To ensure worker safety, the B&W Pantex RSD provides external and internal dosimetry programs, conducts radiation surveys and designates and restricts access to radiological controlled areas. Pantex uses thermoluminescent dosimeters (TLDs) to measure personal radiation exposure for its employees.

Personnel TLDs are used to measure an employee's exposure to radiation. External doses are minimized by limiting the duration of exposure, increasing the distance between personnel and radiation sources and using protective equipment, such as shielded aprons and gloves. Bioassay samples are collected periodically from personnel who work in areas where there is a potential for internal exposure from contamination.

### **Training**

Workers are trained to use the proper equipment and ALARA practices to keep their exposure to radiation and radioactive materials as low as reasonably achievable.

Technicians receive weapons-specific training and are taught exactly what radioactive materials they are working with, the unique attributes of those materials and how to respond to any emergency situation related to the operation. They are given responsibility and authority to stop any operation if there is a radiation safety concern.

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Visitors to Pantex also receive training so they will understand their responsibilities, recognize hazards and minimize potential risks. Personnel not employed by Pantex, but who perform work at Pantex, are required to take a higher level of training that is more specific to the work they will be performing at the plant.

**Additional Information**

The most common radioactive materials found at Pantex are plutonium, uranium, thorium and tritium. Fact sheets for these materials, and for radiation in general, are available on the Internet at <http://www.ead.anl.gov/pub/doc/Cover-Intro-Linked.pdf>