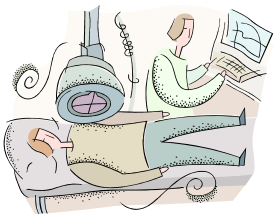
Nuclear 1: Nuclear Security

- **What is radiation?**
- **Where can you find radiation?**
- **How is radiation useful?**
- **Why is important to be able to detect radiation?**

Radiation is simply the process in which energy is emitted as particles or waves. There are several types of radiation (alpha, beta, gamma, neutron, etc.), all of which are particles or waves that are too small to be seen with the human eye. How can we detect it, then? We use special detectors—the radiation particle interacts with the material inside the detector (ionizes it), and produces something that we can observe (called a signal).

Where is all this radiation? There is radiation all around us, all the time. The sun, the soil and rocks, the foods we eat, the water we drink, the building materials we use, all contain naturally occurring radiation that make up about half of our annual radiation exposure. There are also a lot of man-made sources of radiation (think x-ray machines) that contribute to the dose of radiation we receive annually. Less than 1 % of the radiation dose we receive is from nuclear power plants or fallout from past atomic explosive detonations.



How is radiation useful? Nuclear reactors are used to generate and provide electricity to millions of people around the world. Radiation is also used extensively in medical treatments (from x-raying broken bones or teeth to treating some forms of cancer). In fact, 7 out of 10 Americans have received or will receive some sort of diagnostic x-ray or radiation therapy in their lifetime. Radiation is used to kill germs in the foods we eat and to sterilize things like medical equipment and cosmetics. Additionally, radiation is used to study material properties (strengths and weaknesses) and perform carbon dating to age fossils and other objects. Unfortunately, some types of radioactive material are also the base material for nuclear weapons, and must be protected and handled with care.

Why is it important to detect radiation? There are many reasons it is important to detect radiation, but in Nuclear 1 we are going to focus on security. We monitor facilities, border crossings, seaport, etc. to be sure that nuclear material stays in its designated location and doesn't end up in the hands of the bad guys.

In Nuclear 1, you will monitor our sites with a special radiation detector and find where the radioactive sources are hidden. You will become a certified 'Radioactive Detective!'