

## Significant Discoveries and the History of Radiation Protection

Philosophers and scientists have been interested in the basic building blocks of our physical universe since ancient times. In fact, the ancient Greeks were the first to believe that all matter in the universe must be made of tiny building blocks — or atoms. Beginning with the earliest scholars of science throughout history and into this century, scientists have been driven to learn more about the atom and how to control it.



### Significant Discoveries

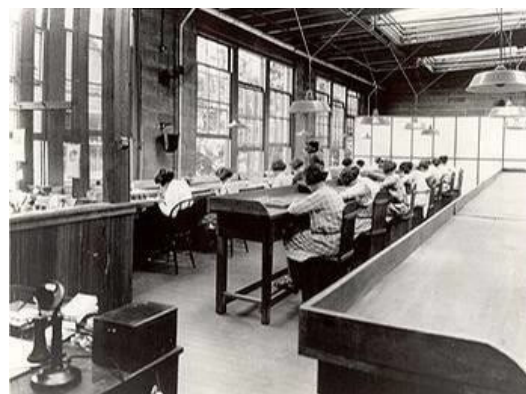
Scientists truly began to make advances in the study of atomic structure and radiation during the late part of the 19th century. Dmitri Mendeleev introduced the periodic system of elements in 1869. In December 1895, Wilhelm Roentgen accidentally discovered the basic properties of x-rays when he captured an x-ray image of his wife's hand. This led to further discoveries in the properties of ionizing radiation and the possibility of using radiation in medicine. In 1896, Henri Becquerel announced the discovery of radioactivity to the Academy of Sciences in Paris after he discovered the radioactive properties of uranium. Marie and Pierre Curie studied the radioactivity of uranium for several years, and discovered the elements polonium and radium after chemically extracting uranium from the ore. Marie Curie reported their discovery and coined the term "radioactivity" in 1898. By the early 1900s the study of radiation was a widely accepted scientific endeavor.



### New Dangers Come with Discoveries

These discoveries did not come without a price. Scientists learned that radiation was not only a source of energy and medicine; it could also be a potential threat to human health if not handled properly. In fact, early pioneers in radiation research died from radiation-induced illnesses from too much exposure.

For instance, Thomas Edison's assistant died from a radiation-induced tumor as a result of too much x-ray exposure. As new uses for radioactive elements were discovered, potentially fatal incidents of overexposure increased.



During World War I, radium paint (a mixture of radium and phosphor) was used on military aircraft instruments to make them glow in the dark so they would be more visible to pilots flying at night. After the war was over, the industry that supported this technology changed its focus to paint glow-in-the-dark clocks and watch faces. The young women who painted these items would form a fine point on their paint brushes by pulling the freshly-dipped brushes between their lips before applying the paint onto the watch faces. Unknowingly, they were swallowing small amounts of radium and damaging their bodies. Several of the women died of unexplained anemia and disease complications with their mouth, teeth and jaw. The dentist who treated one of the women connected the issues with the radium dial painting.

## Meeting the Need for Radiation Protection

By 1915, the British Roentgen Society had adopted a resolution to protect people from overexposure to x-rays. This was one of the first organized efforts in radiation protection.

American organizations had adopted the British protection rules by 1922. Awareness and education continued to grow. Throughout the 1920s and 1930s more guidelines were developed, scientists were studying the effects of radiation on living organisms, and various organizations were formed to address radiation protection in the United States and overseas.

By the 1930s, physicists were beginning to understand fission and radioactive decay, which led to the research and development of the first nuclear reactors and atomic weapons in the 1940s. Until that time, radiation protection was primarily a non-governmental function. After World War II, the development of the atomic bomb and nuclear reactors caused the federal government to establish policies dealing with human exposure to radiation. In 1959, the Federal Radiation Council was established to:

- Advise the President of the United States on radiological issues that affected public health.
- Provide guidance to all federal agencies in setting radiation protection standards.
- Work with the states on radiation issues.

In 1970, Congress created the U.S. Environmental Protection Agency (EPA) to serve as the primary federal agency to protect people and the environment from harmful and avoidable exposure to radiation. EPA's Radiation Protection Division carries out this responsibility by:

- Setting standards that protect people and the environment.
- Managing federal radiation protection programs.
- Providing radiation protection guidance and emergency response training to other federal agencies.
- Working closely with other national and international radiation protection organizations to further our scientific understanding of radiation risk.