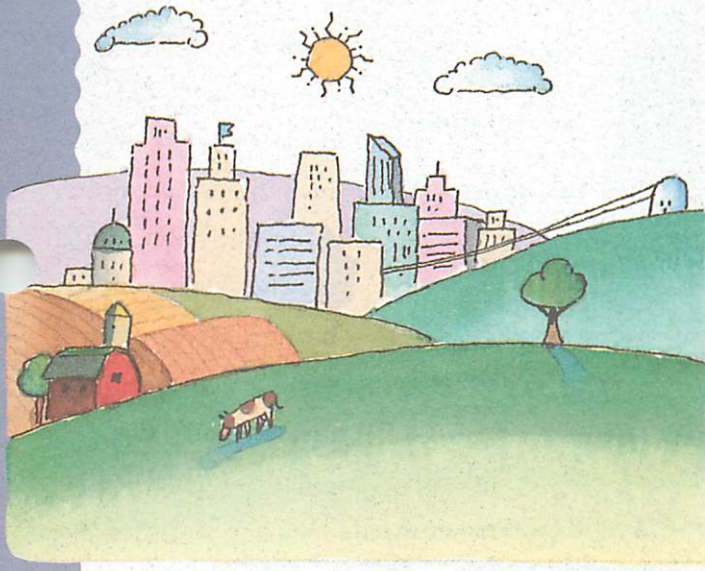
Nuclear Energy:



- How do we keep nuclear power plants safe?

Nuclear power plants have built-in sensors to watch temperature, pressure, water level and all other operating indicators that are important to safety. These sensors are linked to control systems that adjust or shut down the nuclear reactor—immediately and automatically—at the first sign of trouble.

Multiple Barriers

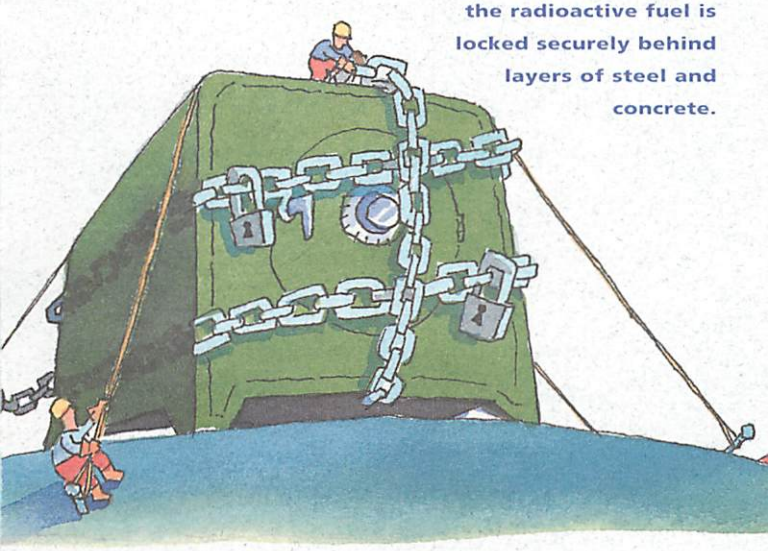
In addition to backup systems that monitor and regulate what goes on inside the nuclear reactor, U.S. nuclear power plants also use a series of physical barriers to prevent the escape of radioactive material.

- The first barrier is the nuclear fuel itself. The uranium fuel is in the form of solid ceramic pellets. Most of the radioactive by-products of the fission process remain locked inside the fuel pellets.
- The next barrier is the fuel rods, which hold the fuel pellets. They're made of a zirconium alloy that is resistant to heat, radiation and corrosion.
- The fuel rods are inside a large steel pressure vessel, with walls about eight inches thick.
- Finally, these barriers are enclosed in a massive reinforced concrete structure—called the containment—with walls that are about four feet thick.

To reach the environment, radioactive material would have to escape from each of these barriers in succession. Even Houdini couldn't pull off that kind of escape.

The People Factor

The people who work at nuclear power plants are taught that nothing matters more than safety. They are drilled and tested continually, to make sure they understand the plant, follow procedures and pay strict attention to detail.



In nuclear power plants, the radioactive fuel is locked securely behind layers of steel and concrete.

They also must obey the regulations of the Nuclear Regulatory Commission, an independent federal agency that licenses and monitors all U.S. commercial nuclear power plants.

Today, we Americans get more electricity from nuclear energy than from any other source, except coal.

The NRC requires all plant operators to pass tough licensing—and relicensing—exams.

There are NRC inspectors at each of the more than 100 U.S. nuclear power plants, monitoring daily operations. The NRC also conducts regular—and unannounced—inspections, which cover all plant operations.

No other U.S. industry is regulated more carefully or strictly than nuclear power plants.

Lessons Of The Past

Two serious accidents have occurred at commercial nuclear power plants—at Three Mile Island in Pennsylvania and at Chernobyl in what used to be the Soviet Union.

No one was injured or died as a result of the 1979 accident at Three Mile Island.

Half of the uranium fuel in the reactor melted, but only minute amounts of radioactive material escaped into the environment—because the multiple barriers contained it, just as they were designed to. The radiation exposure from Three Mile Island was much less

than most Americans receive each year from naturally occurring radiation in soil, rocks, air, food and water.

The 1986 Chernobyl accident was much different. Because the plant lacked a containment structure, radioactive material did escape—killing about 30 people and sending many more to hospitals with radiation exposure and burns. Could Chernobyl happen in the United States?

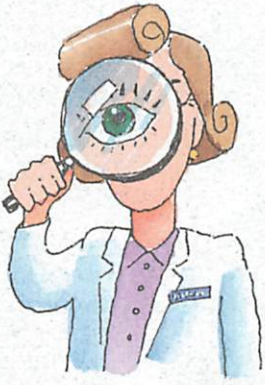
No. Because, a plant like Chernobyl—lacking a containment structure and other safety features—could never be licensed to operate in America.

Dedication To Safety

U.S. nuclear power plants are safe. But are they risk-free?

No, nothing is.

But thanks to careful, conservative design and training, the safety of nuclear power plants has been raised to a very high level.



The Nuclear Regulatory Commission has inspectors at every nuclear power plant, monitoring operations every day.

If there's a nuclear power plant in your state or region, congratulations. You're enjoying all the benefits of nuclear energy—every time you turn on a lamp, watch TV news, play a video game, take in a movie, or get ice cubes from the freezer.

And you're getting all these benefits from power plants that are helping keep your air clean.

But have you ever wondered if American nuclear power plants are really safe? They do, after all, contain radioactive materials—the stuff left over after uranium atoms are split to create heat to run the plant.

Companies that run nuclear power plants—and the government watchdogs who look over their shoulders—make sure they operate reliably and keep the radioactive materials safely inside.

Automatic And Immediate Safety Systems

To understand why nuclear power plants are safe, it helps to know a bit about how they work.

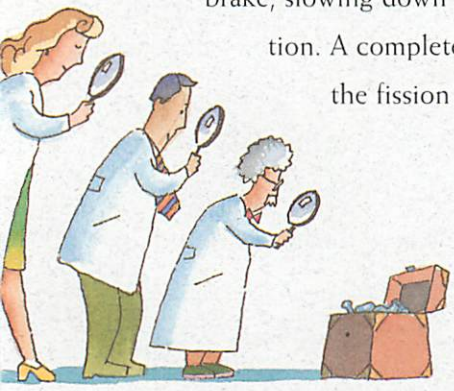
Nuclear power plants are fueled with uranium. The uranium atoms split—a process called fission—producing heat that boils water to steam. The steam is used to spin a turbine to produce electricity.

The leftover radioactive materials—a by-product of nuclear fission—are carefully controlled to be sure no dangerous levels of radiation get outside the plant.

One danger that doesn't exist: a nuclear explosion. It's impossible for a nuclear power plant to explode like an atomic bomb because of the low concentration of uranium in the fuel.

To protect the public from a release of radiation, the plant design takes advantage of natural processes and incorporates backup safety systems—safety in depth. The systems work automatically and immediately.

For example, water cools the fuel in the reactor. Yet, if increasing heat turns too much water into steam, the lack of water acts as a brake, slowing down the nuclear reaction. A complete loss of water stops the fission process altogether.



The nuclear energy industry leaves nothing to chance: Everything is checked and double-checked.

Nuclear plant designers also assume that equipment will fail and that operators will make errors. So nuclear power plants have multiple backup systems to cope with equipment failure and human error.

We have other brochures like this one on other nuclear energy topics. Call or write us if you're interested.

- SAFETY IN MOTION: Transportation of radioactive materials
- NUCLEAR ENERGY: How nuclear power plants work
- RADIATION: We know you have questions. Here are some answers.
- NUCLEAR ENERGY: What has it done for us lately?
- LOW-LEVEL WASTE: What should we know about it?
- HIGH-LEVEL WASTE: What will we do with used nuclear fuel?

SUITE 400
1776 I STREET, NW
WASHINGTON, DC
20006-3708

PHONE 202.739.8052
FAX 202.785.4019

NEI
NUCLEAR
ENERGY
INSTITUTE