METHODS OF PRODUCING ELECTRICITY

PAGE 54-63 (WORKING WITH NEW TECHNOLOGY)

NUCLEAR POWER STATION:

On considering what we have seen on the website «Kids Britannica», concerning the Chernonbyl disaster, before talking about the Nuclear power and the Nuclear power plants as a source of energy, let's focus on the Chernobyl accident as it was considered the worst in the human being story.

The worst accident in the history of nuclear power generation was the Chernobyl disaster. It occurred in 1986 in Ukraine, which was then part of the Soviet Union. The accident caused large amounts of radioactive particles to be released into the air. It caused illness and death in the local population and left the land in the area unusable. Many thousands of people had to leave their homes. The radioactivity spread over much of Europe, contaminating crops and livestock* in some neighboring countries.

The Chernobyl power station was located near the town of Pryp'yat. It lay just northwest of the city of Chernobyl and 65 miles (104 kilometers) north of Kyiv (Kiev). The station had four reactors producing electric power. The reactors began operating between 1977 and 1983.

*: raccolti e bestiame

Chernobyl nuclear power station

The Chernobyl disaster occurred on April 25–26, 1986. Technicians at reactor Unit 4 attempted a test to see if the reactor could be cooled. Workers shut down the reactor's power-regulating system and its emergency safety systems. On doing this they made a series of mistakes that caused the reactor to become unstable. At 1:23 am on April 26 several explosions triggered a large fireball. It blew off the heavy steel and concrete lid of the reactor, which released radioactive material into the atmosphere.

On April 27 the Soviet government began to evacuate the 30,000 inhabitants of Pryp'yat. They then attempted to cover up *the incident. However, on April 28 Swedish monitoring stations reported abnormally high levels of wind-transported radioactivity. The Soviet government admitted there had been an accident at Chernobyl. An international outcry arose over the dangers posed by the radioactive emissions. By May 4 workers had mostly contained both the heat and the radioactivity leaking from the reactor core. They buried radioactive debris at some 800 temporary sites. Later in the year workers enclosed the highly radioactive reactor core in a concrete-and-steel structure known as a sarcophagus. However, it was later deemed structurally unsound, and the core was enclosed in a larger steel structure during the 2010s.

*: coprire, nascondere.

Some sources state that two people were killed in the initial explosions. Others report that the figure was closer to 50. Dozens more contracted serious radiation sickness, with some later dying. The radioactivity created by the atomic bombs was spread by the wind over Belarus, Russia, and Ukraine and It reached France and Italy. Millions of acres of forest and farmland were contaminated. Although many thousands of people were evacuated, many remained there. In the following years many livestock were born deformed. Some scientists predicted several thousand radiation-induced illnesses and cancer deaths among people in the long term.

The Chernobyl disaster sparked criticism of unsafe procedures and design flaws in Soviet reactors. It also heightened resistance to the building of more such plants
Following the disaster, the Soviet Union created a circle-shaped exclusion zone. It extended about 18.6 miles (30 kilometers) in all directions from the nuclear power plant. Officials later added other areas to the zone. The government eventually allowed some former residents to return to the exclusion zone to live. In the 21st century Chernobyl became a tourist attraction, with several companies offering guided tours.

Here’s the transcription of the script in the video:

NARRATOR: April 1986 - in the Soviet Nuclear Power Station of Chernobyl deep within the Ukraine, an emergency is simulated, a routine test.

OLEG GENRICH: "The output of the reactor decreased, just like in any other night. I didn’t know anything about a safety test. I did my work just like always. Everything seemed normal."

NARRATOR: But the output of Reactor 4 falls too quickly. It’s out of control. When the test is eventually stopped, it is already too late. There’s a core meltdown.

GENRICH: "I didn't understand what had happened. I was in such a state, I thought I was in a different world. 'This is not happening to me.' I pulled myself together and told myself I’m alive, everything is okay. Then I heard my colleagues screams."

NARRATOR: The shattered reactor after the catastrophe - high radiation levels escape unchecked. No one had expected such a disaster. Thousands of helpers, so-called liquidators, shovel debris into the ruin. That’s how they’re trying to reduce the radioactive emissions. And they’re exposed to it virtually unshielded. Internal bleeding, hair loss and burnt skin. Thirty-six helpers die within a short span of time due to radiation sickness. Cancer later kills another 10,000 people. It’s a futile battle. Radioactive clouds carry contaminated dust all over Europe. Initially, no one in the West knows anything about the accident. But then the radiation dosimeters begin to register abnormalities in Sweden. The measurements are thought to be caused by an incident at the Forsmark power station. But it quickly becomes clear that there’s been an accident of monumental proportions in the Soviet Union. But Moscow keeps its cards close to its chest.

NEWS CAST: "Today, the Soviet Union has again refused western demands to provide detailed information about the reactor accident."

NARRATOR: Fear of radiation spreads rapidly. There is radioactive dust on food. What is still safe from the cloud coming from Chernobyl? Even though the real exposure levels in Germany are very low, some fields including their harvest are ploughed into the ground.

FRIEDHELM OST: "Nobody knew what Becquerel are, but everyone talked about it. The sand in sandpits on playgrounds was changed. Vegetables weren’t eaten under any circumstances. Not in Germany."

NARRATOR: The anti-nuclear lobby considers their cause validated and gets fresh support, especially in Germany. Today, Chernobyl is still a death zone. New pictures emerge from the inside of the sarcophagus. The reactor core has melted into a radiating lump. The radiation levels are still fatal. And the sarcophagus is falling apart. Radiation is escaping at many places. It was the worst nuclear accident of the 20th century

HOW NUCLEAR REACTOR WORKS:

A NUCLEAR REACTOR CREATE AN ENORMOUS AMOUNT OF ENERGY, AS HEAT, FROM A SMALL AMOUNT OF FUEL. THIS ENERGY IS CREATED THROUGH A PROCESS CALLED «FISSION»THAT CONCERNS THE SPLITTING OF THE NUCLEOUS OF THE ATOM. THE URANIUM DIOXIDE IS THE FUEL, IT IS SEALED IN LONG METAL TUBES (FUEL RODS*), COLLECTED TOGETHER IN THE CORE OF THE REACTOR.

HERE'S THE MAIN PASSAGES:

1) THE URANIUM ATOMS RELASE THE NEUTRONS
2) THE NEUTRON STRIKE OTHER URANIUM ATOMS SO THE ATOM SPLITS, PRODUCING HEAT AND RELASING MORE NEUTRONS.
3) THE NEUTRONS STRIKE OTHER ATOMS, CAUSING A SORT OF «SPLITTING CHAIN». THIS PROCESS CAUSES THE FISSION OF TRILLIONS OF ATOMS IN A VERY SMALL AMOUNT OF TIME AND IT PRODUCES A HUGE AMOUNT OF ENERGY.

*: BARRE DI COMBUSTIBILE

IN GROUP: DISCUSS THESE STATEMENTS

1) ITALY'S NUCLEAR POWER STATIONS HAVE BEEN CLOSED DOWN? WAS THIS A MISTAKE? WHY YES, WHY NOT

2) IS ITALY NOW IN A PARTICULAR DIFFICULT POSITION WITH REGARD TO ENERGY?

SAFETY IN WORKPLACES

CONTROLLING A NUCLEAR REACTOR

IN A NUCLEAR STATION THE CHAIN CONTROL IS THE MOST IMPORTANT THING TO DO. IN ORDER TO AVOID ACCIDENTS OR MISTAKES, THERE ARE SOME PASSAGES TO FOLLOW:

1) CONTROL RODS REGULATE THE RATE OF A CHAIN REACTION
2) THE CONTAINMENT STRUCTURE HOLDING THE CORE OF THE REACTOR HAS BEEN DESIGNED TO HOLD THE HIGH PRESSURE.
3) COOLANTS HELP TO CONTROL THE TEMPERATURE OF THE REACTOR CORE
4) EMERGENCY SECURITY SYSTEMS MONITOR THE LEVEL OF RADIATIONS AND ENABLE THE SHUTDOWN OF THE REACTOR.

OTHER SAFETY TIPS:

1) EVEN IF NUCLEAR PLANTS DO NOT EMIT FUMES, THEY GENERATE MORE HEATH THAN OTHER PLANTS. THEY NEED MORE WATER TO GET COOLED AND SO THEY DUMP MORE HOT WASTE WATER INTO THE NEAREST RIVERS OR LAKES. MANY PLANTS HAVE COOLING TOWER TO TRY AND SOLVE THIS PROBLEM.

2) THE RADIOACTIVE WASTE IS A PROBLEM: A RADIOACTIVE WASTE REMAINS DANGEROUS FOR THOUSAND OF YEARS; THE WASTE ARE STORED AND BURIED IN EARTH, BUT THERE ISN'T AN EFFECTIVE WAY (AND A SAFE ONE) TO RECYCLE OR PERMANENTLY DISPOSE THEM.

3) A TERRORIST ATTACK TO A NUCLEAR PLANT, OR AN ACCIDENT COULD RELEASE LARGE AMOUNT OF RADIOACTIVE MATERIAL IN THE AIR AND LEAD TO A MELTDOWN.