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ECOLOGICAL ACCIDENT IN CHERNOBYL

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In the last decade, public concern for the use of nuclear energy has increased dramatically. Few can debate that nuclear energy is clean, and can be produced without using hardly any natural resources. Likewise, few can debate that radiation is harmful to the environment, unsafe, and a great danger for all living things. Scientists and mankind have to weigh the positive as well as the negative aspects of nuclear radiation, and then decide what source of energy the future holds that will benefit not only all living things, but also the environment.

The Chernobyl disaster, was a nuclear accident that occurred on 26 April 1986 at the Chernobyl Nuclear Power Plant in the Ukrainian Soviet Socialist Republic (then part of the Soviet Union), now in Ukraine. It is considered to be the worst nuclear power plant disaster in history and the only level 7 event on the International Nuclear Event Scale. It resulted in a severe release of radioactivity following a massive power excursion that destroyed the reactor. Most fatalities from the accident were caused by radiation poisoning.

On April 26, 1986 shortly after 01:23 a.m., reactor number four at the Chernobyl plant, near Pripyat in the Ukrainian Soviet Socialist Republic, had a fatal meltdown. Further explosions and the resulting fire sent a plume of highly radioactive fallout into the atmosphere and over an extensive geographical area, including the nearby town of Pripyat. Four hundred times more fallout was released than had been by the atomic bombing of Hiroshima. The plume drifted over large parts of the western Soviet Union, Eastern Europe, Western Europe, and Northern Europe. Contaminated rain fell as far away as Ireland and large areas in Ukraine, Belarus, and Russia had to be evacuated, with over 336,000 people resettled. According to official post-Soviet data, about 60% of the fallout landed in Belarus.

The Chernobyl nuclear power plant is located next to the Pripyat River, which feeds into the Dnipro River reservoir system, one of the largest surface water systems in Europe. The radioactive contamination of aquatic systems therefore became a major issue in the immediate aftermath of the accident. In the most affected areas of Ukraine, levels of radioactivity (particularly radioiodine: I-131, radiocaesium: Cs-137 and radiostrontium: Sr-90) in drinking water caused concern during the weeks and months after the accident. After this initial period, however, radioactivity in rivers and reservoirs was generally below guideline limits for safe drinking water.

Bio-accumulation of radioactivity in fish resulted in concentrations (both in western Europe and in the former Soviet Union) that in many cases were significantly above guideline maximum levels for consumption. Guideline maximum levels for radiocaesium in fish vary from country to country but are approximately 1,000 Bq/kg in the European Union. In the Kiev Reservoir in Ukraine, concentrations in fish were several thousand Bq/kg during the years after the accident. In small "closed" lakes in Belarus and the Bryansk region of Russia, concentrations in a number of fish species varied from 0.1 to 60 kBq/kg during the period 1990–92. The contamination of fish caused short-term concern in parts of the UK and Germany and in the long term (years rather than months) in the affected areas of Ukraine, Belarus, and Russia as well as in parts of Scandinavia.

Groundwater was not badly affected by the Chernobyl accident since radionuclides with short half-lives decayed away long before they could affect groundwater supplies, and longer-lived radionuclides such as radiocaesium and radiostrontium were adsorbed to surface soils before they could transfer to groundwater. However, significant transfers of radionuclides to groundwater have occurred from waste disposal sites in the 30 km (19 mi) exclusion zone

around Chernobyl. Although there is a potential for transfer of radionuclides from these disposal sites off-site (i.e. out of the 30 km (19 mi) exclusion zone), the IAEA Chernobyl Report argues that this is not significant in comparison to current levels of washout of surface-deposited radioactivity. According to reports from Soviet scientists at the First International Conference on the Biological and Radiological Aspects of the Chernobyl Accident (September 1990), fallout levels in the 10 km zone around the plant were as high as 4.81 GBq/m². The so-called "Red Forest" of pine trees, previously known as Worm Wood Forest and located immediately behind the reactor complex, lay within the 10 km zone and was killed off by heavy radioactive fallout. The forest is so named because in the days following the disaster the trees appeared to have a deep red hue as they died due to extremely heavy radioactive fallout. In the post-disaster cleanup operations, a majority of the 4 km² forest was bulldozed and buried. The site of the Red Forest remains one of the most contaminated areas in the world. Some animals in the worst-hit areas also died or stopped reproducing. Most domestic animals were evacuated from the exclusion zone, but horses left on an island in the Pripyat River 6 km (4 mi) from the power plant died when their thyroid glands were destroyed by radiation doses of 150–200 Sv. Some cattle on the same island died and those that survived were stunted because of thyroid damage.

It is unknown whether fallout contamination will have any long-term adverse effect on the flora and fauna of the region, as plants and animals have significantly different and varying radiologic tolerance compared with humans. Some birds are reported with stunted tail feathers (which interferes with breeding). There are reports of mutations in some plants in the area, leading to unsubstantiated tales of a "forest of wonders" containing many strangely mutated plants. Specifically, some trees have weirdly twisted branches that do not reach for the sky. The Chernobyl area has not received very much biological study, although studies that have been done suggest that apparently healthy populations may be sink instead of source populations; in other words, that the apparently healthy populations are not contributing to the survival of species. Using robots, researchers have actually retrieved samples of highly-melanized black fungus from the walls of the reactor core itself. It has been shown that certain species of fungus, such as Cryptococcus neoformans and Cladosporium, can actually thrive in a radioactive environment, growing better than non-melanized variants, implying that they use melanin to harness the energy of ionizing radiation from the reactor.

The Exclusion Zone around the Chernobyl nuclear power station is reportedly a haven for wildlife. As humans were evacuated from the area just over 23 years ago, existing animal populations multiplied and rare species not seen for centuries have returned or have been reintroduced, for example lynx, wild boar, wolf, Eurasian brown bear, European bison, and eagle owl. Birds even nest inside the cracked concrete sarcophagus shielding in the shattered remains of reactor number 4. The Exclusion Zone is so lush with wildlife and greenery that in 2007 the Ukrainian government designated it a wildlife sanctuary, "Chernobyl Special"; and at 488.7 km^2 it is one of the largest wildlife sanctuaries in Europe. According to a 2005 U.N. report, wildlife has returned despite radiation levels that are presently 10 to 100 times higher than normal background radiation. Although they were significantly higher soon after the accident, the levels have fallen because of radioactive decay.

The use of radiation has many positive attributes, but at the same time, the significance of the drawbacks are overwhelming. Neither government nor scientist can guarantee the safety of nuclear plants. Without this guarantee, there is an immediate concern for the welfare of the world. I believe countries around the world should begin a gradual process of shutting down nuclear plants and begin making a much greater effort to develop widespread use of other sources of energy, such as wind and solar power.