Effect of nuclear radiation on the environment

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Introduction

By the early 17 th century, certain electrical devices and power generators were being invented by certain scientists, who did not yet know that they were scratching the surface to a much more dangerous form of energy, to be discovered by scientist Einstein a few centuries later. This form of energy to be produced through a substance named Uranium was to be introduced as a more efficient power source. However, the process with which this energy was created was to be exploited, which would result in what is known today as “ The Weapons of Mass Destruction.”

The use of such form of powerful energy for certain military uses can result in horrific results. A quick study shows that even a minor war would quickly decline the world climate and environment, inflicting harm that could last for decades. Richard Turco, a scientist at the UCLA said that exploding only between 30 and 70 missiles – just 0. 03% of the entire storage – would cause enough pollution to create climatic disasters unseen before in human history. He also said the effects would be “ much greater than what we’re talking about withglobal warming and anything that’s happened in history with regards volcanic eruptions.” Summarily, it can alter and damage not only the atmosphere, but also all forms of life such as humans, animals, and plants. (Jha)

The Invention of Nuclear Power and Missiles

Problems Encountered During Creation:

The invention mainly started to take place during midst 1939, just before the beginning of the second Great War. It all commenced when Albert Einstein and several other scientists wrote to President Franklin D. Roosevelt, informing him of the Nazi's efforts to cleanse and exploit Uranium-235, which could be used to build a weapon of mass destruction. It was at that moment that FDR decided to begin " The Manhattan Project", which was simply to produce a viable nuclear bomb. However, there were many complicated issues to be faced. The most significant of these issues was the inability to extract " enriched" uranium to maintain a series of reactions. Back then, uranium-235 was extremely difficult to extract, and the ratio of extracted ore to uranium metal was as low as 500: 1. Furthermore, over 99% of the refined metal from the ore was uranium-238, which was rendered useless for the invention of an atomic bomb. The two different types of isotopes were nearly identical in their chemical makeup, and only possibly separated by mechanical means.

Solution of the Problem and Testing of the new Invention:

Soon thereafter, a massive enrichment lab was erected at Oak Ridge, Tennessee. Harold Urey and his colleagues came up with an extraction system, which worked on the principles of gas diffusion, while Ernest Lawrence put into action a process which involved magnetic force to separate the two isotopes. A gas centrifuge was then used to separate the lighter uranium-235 from the heavier uranium-238. After this separation, all that was needed was for the scientists to put the concept of atomic fission (which involves splitting the atom) to the test. Overall, approximately two billion dollars were invested into " The Manhattan Project." Throughout the

entire path, it was a scientist by the name of Robert Oppenheimer who oversaw the progress of the campaign from beginning to end. Finally, the day of testing arrived. It was on July 16, 1945 where it would be found out if the entire project was just a complete dud, or if it would put an end to the massacre. Upon placing the missile in the sea, a massive white blast took place. The light turned red as the power of the explosion shot upwards at 360 feet per second. The explosion resembled the shape of a mushroom. “ The Manhattan Project had been a success.” (Bellis)

Effect of Nuclear Radiation on Humans

Immediate (Short Term) Effects:

Survivors of such a devastating blast will be killed within a few days due to radioactive fall-out. The severity of the fall-out will be determined by whether the nuclear bomb explodes in mid-air, or upon impact with the ground. The first of these will leave a larger blast impact. The latter, however, will throw much higher quantities of radioactive debris into the surrounding atmosphere. The area included in this fall-out is strictly dependent upon the wind speed and its direction. The heavier the particle of radioactive debris, the higher the chance it drops in close vicinity. Smoother and rather smaller particles, however, are thrown over longer distances before their fall. Some of these particles are so fine that they can combine with vaporized water and fall as radioactive rain 1700 miles from the original blast. Anyone who is in the range of this radioactivity will suffer from hair loss, internal bleeding, fever, bleeding from the gums, and terminal coma. Much of these have no effective medicine and are fatal. (Carnegie)

Long Term Effects:

Genetic studies on the children of nuclear bomb survivors who were exposed to the atmosphere afterwards was conducted by the Atomic Bomb Casualty Commission and the Radiation Effects Research Foundation ever since 1948. The analysis of past studies shows signs of abnormal pregnancy outcomes: deformation, stillbirth and early child death. Other effects include chromosome aberrations. Chromosome aberrations can be defined as an extra, irregular, or missing portion of a certain chromosomal DNA. This alteration of chromosomes can cause several inborn diseases due to aneuploidy. An example of such a human disease is Down syndrome, where the affected have three copies of chromosome 21 instead of a natural two. (Nakamura)

Effect of Nuclear Bombs on the Climate and Atmosphere

General Effects on the Climate:

Although there has been a two-thirds decrease in the world’s nuclear arsenal since 1987, scientific research clarifies that the results of even a minor nuclear war can end human history and leave mother earth inhabitable. Studies conducted at several U. S universities predict that the explosion of a tiny amount of the global nuclear storage within large metropolitan areas would cause catastrophic disruptions in the Earth’s climate and massive destruction of out protective ozone layer. Studies conclude that a small or rather regional conflict between two nations such as India and Pakistan would disrupt the climate for decades to come.

Details:

In a small-scale war, denotation of about 100 Hiroshima-sized bombs – under half a percent of the world’s arsenal- would send over five million tons of soot and smoke over cloud-level. This could prevent almost 10% of the sunlight from reaching the northern hemisphere; this smoke and soot can remain in the atmosphere for a couple of decades. This would cause average surface temperatures beneath this layer to become lower than it has ever been in the last 1000 years. However, if a large-scale war event was to take place, and the United States and U. S. S. R ere to launch their full arsenal, over 150 million tons of smoke would rise above cloud-level. This would block over 75% of sunlight from reaching the northern hemisphere, and 30% of sunlight from reaching the southern hemisphere. Under such extreme and severe conditions, it only requires a few days for the temperatures to drop below freezing levels in agricultural areas. Average surface temperatures would become colder than it has ever been in the past 18, 000 years which coincides with the peak of the previous ice age. Rainfall would decrease by 90%, growing seasons would be completely eliminated, and the majority of the human and animal populations would die of starvation.