1986 Chernobyl Nuclear Disaster

During a normal test of the Chernobyl Nuclear Power on April 26th, 1986, things went from producing a significant amount of energy for the USSR to the biggest man-made disaster in all of history. Two workers died on that day, but that doesn’t compare to the amount of damage the event had. 28 people died a few days after, 115,000 people were evacuated, 220,000 relocated, and there were about 6,000 cases of thyroid cancer due to the radiation emitted by the explosions. Also, the effects of the explosion are not done today. The radiation from the event may contaminate the area for 100 to 320 years. Much of the radiation from the explosion has dispersed due to the half-life of cesium (one of the more common radioactive substances spread after the disaster and a common byproduct of U-235 decomposition). It’s half-life is approximately 30 years, which in comparison is much shorter than other radioactive substances like U-235, but it will still last as long time. Because of cesium’s ability to form ionic attractions, it can easily be dissolved into water and thus traveled quickly throughout the western Europe and the eastern Soviet Union. despite only about 5% of the core materials being shot into the environment from the explosion, the radioactive effects on the area were enormous.

There was very little mitigation or preparedness before the Chernobyl disaster in 1986. The reactor was built in a fairly remote area and there were only about 115,000 people lining in a 30 km radius of the reactor. The placement of the reactor and different standard cooling mechanisms inside the reactor were some of the only mitigation techniques used in the reactor which made the disaster even worse since there were very few measures taken to prepare the surrounding communities in the event of a disaster. The reactor was also not very well built or maintained, and because it used a design which created massive amounts of steam to fuel turbines which created power, but during a test, the steam was allowed to get out of control and the reactor emergency shutdown was turned off which led to the inevitable explosion. If there were more mitigation standards like better qualified workers and better engineered reactor that was not as susceptible to overheating and there could have been better warning systems to alert the nearby towns in the area of a possible explosion or if tests were being done on the reactor.

The third principle stage is response, and the officials working on Chernobyl made a large effort to help respond as quickly as the lack of preparation allowed. Over 115,000 people were evacuated from the immediate area and over 220,000 people were evacuated a while later in the surrounding areas. The explosion set fire to most of the reactor area so many firefighters were sent in to diminish the damage the fire could cause, but they were also in very unsafe territory and thus many were harmed by radiation poisoning and received different types of cancer, specifically thyroid cancer. Though without
these brave men and women, much more damage could have been done to the reactors resulting in more radioactive material being released. Despite many efforts to remove people from contaminated areas, many decided to stay and suffer the consequences of the radiation, but all people were removed from the immediate area around the reactors.

The final part of the principle cycle is recovery, which was aided by the United Nations. Because there are still traces of radioactive material in the area, much of the food and water was transported into the contaminated areas. Organizations like the UN and many other groups raised funds to help get clean resources into the area. The Red Cross and the Red Crescent also aided in providing both emergency and charitable aid to the people living in the areas around the explosion.

The stage that may have played a decisive role in the short and long term effects of the explosion was probably mitigation. The lack of safety precautions and the large number of unskilled workers allowed this specialized reactor to so easily explode. As was stated before, this particular reactor is a RBMK reactor which was made to produce as much power from Uranium pellets as possible. Water’s ability to be both a coolant and a neutron absorber allow the reactor to have what’s called a positive void coefficient because water is better at these two aspects than steam is. Any steam bubbles that form over the process change the ratio or the positive void coefficient. This coefficient is the most influential part of reactor reactivity and thus allows more power to be produced, but at a higher cost. Since this explosion, many changes have been made to other RBMK reactors to lower this coefficient which makes them much safer.

Sources