

Q&A: Chernobyl 20 years on

Only a little Greenpeace disinformation here.

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Ukraine is holding a series of events to commemorate the 20th anniversary of the world's worst nuclear disaster (**the only bad accident ever**) at the Chernobyl power plant. Two decades after the reactor exploded, arguments continue over the full impact of the disaster.

The BBC's Stephen Mulvey, Mark Kinver and a group of experts answered some of your questions about the disaster.

Q: If the Chernobyl area is so dangerous how are we actually getting reports from there?

Stephen Mulvey : Gas masks are essential inside the sarcophagus erected over the ruins of the reactor which exploded in 1986. However, they are not necessary in the rest of the plant and in the evacuated zone around it. Some visiting journalists wear simple cloth or paper masks when in the zone (similar to the sort that might be used for DIY), and some also wear a disposable outer layer of clothes.

Most of the radiation is no longer on the surface, but has sunk to a depth of between 5cm and 10cm. The most important thing is not to eat contaminated food – in particular, mushrooms, berries, game animals or fish from contaminated areas.

Q: Why was the release of radioactivity at Chernobyl 400 times higher than the release by the atomic bombs at Hiroshima and Nagasaki?

Nicholas Beresford and Jim Smith, UK's Centre for Ecology and Hydrology : The atomic bomb explosions caused a very large burst of gamma rays and neutrons over a short period of time but, relative to Chernobyl, little long-term radioactive contamination of the environment.

The explosion at Chernobyl released a large amount of radioactivity from the reactor including Caesium-137 and Strontium-90 which both have physical half-lives of about 30 years, although there are also actinides (such as plutonium) which have half-lives of many thousands of years.

The accident at Chernobyl was not a "nuclear explosion" it was actually a steam explosion caused by a rapid and excessive build-up of heat.

Q: What exactly are the plans and timelines for deconstructing the remaining plant? How many years before the remains are safe?

Stephen Mulvey : A huge cover, known as the New Safe Confinement, will be erected over the sarcophagus some time after 2008.

Staff at Chernobyl regard 2010 as a possible, but quite optimistic date. Once the arch is in place, part of the sarcophagus will be dismantled, but the remains of the nuclear fuel – which melted down and poured into the lower reaches of reactor number four – will probably not be touched for decades at least.

As regards the other reactors (numbers one to three) the fuel is being removed from them now, but as of today Ukraine does not have a long-term spent fuel storage facility. The reactors themselves will be left for decades before they are dismantled, to give time for radioactive isotopes to decay.

The spent nuclear fuel is the most hazardous material to deal with. It includes one isotope of Plutonium, Plutonium-239, which has a half-life of 24,000 years. After 240,000 years (10 half-lives) only 0.1% will remain. After 720,000 years (30 half-lives) it should be fairly safe.

Q: What is the true impact of this disaster on our lives? There appears to be an increase in the number of younger people suffering from cancer in Europe.

Elizabeth Cardis, International Agency for Research on Cancer : We have a report which came out a week ago which reviews trends over the whole of Europe. We found no increase in cancer that could be attributed to Chernobyl, except for the case of thyroid cancer in the most contaminated regions.

Mike Repacholi, head of the World Health Organisation (WHO) Radiation and Health Programme :There is virtually no effect on children from the Chernobyl accident in the UK. Chernobyl fallout on the UK was minimal and the number of cancers that would come from such fallout is extremely low.

Q: I was living in West Germany, accompanied by my family, when the Chernobyl reactor exploded. Since then (20 years later) my wife has been treated for thyroid problems and my eldest daughter has had fertility problems. Are these a legacy of Chernobyl?

Mike Repacholi, head of the WHO's Radiation and Health Programme : It is extremely unlikely. There was some significant deposition of Chernobyl fallout in southern Germany, but the probability of these health problems being due to Chernobyl is extremely remote.

There has been a general increase in the incidence of thyroid cancer around the world, so the fact that someone has thyroid cancer or thyroid problems does not mean that it is due to Chernobyl. And there is no indication that the low doses from Chernobyl cause fertility problems.

Q: What is the current level of ground water contamination in the zone of exclusion and in the vicinity?

Jim Smith of the Centre for Ecology and Hydrology :There is significant contamination of groundwater in small areas around the destroyed reactor and close to the many waste storage facilities in the exclusion zone.

But studies by Ukrainian scientists have shown that there is no significant risk to people from this contamination because nobody is using this groundwater for drinking. The Ukrainian scientists have also studied the long term movement of radioactivity out of the exclusion zone to the Pripyat River (and eventually the Kiev Reservoir). They found that (because of radioactive decay and dilution) this will not present a significant risk to people outside the Chernobyl exclusion zone.

Shortly after the accident there were major concerns in Kiev over the safety of the water supply. But now, the levels of radioactivity in the Kiev reservoir are much lower than safe limits set by the World Health Organisation.

Q: Why is Chernobyl so newsworthy when it is far less lethal than all the coal power plants that still operate?

Charlie Kronick, **paid** Greenpeace UK campaigner : Well, perhaps less than 100 people died on the day of the Chernobyl accident, but the ongoing health impacts of Chernobyl are staggering. Our report, published last week, shows that the full consequences of the Chernobyl disaster could top a quarter of a million cancer cases and nearly 100,000 fatal cancers.

Gregory Hartl, WHO spokesman : It is often the case that punctual and/or catastrophic events capture media attention more readily than a phenomenon which has no discernible beginning, end and/or easy-to-identify victim. This is unfortunate, as we believe that air pollution (from all sources) kills an estimated 2.4 million people per year. We here at WHO are constantly trying to draw attention to this major killer, but we do not control the media's and public's interest and imagination.

Q: Why do we continue to use the Russian spelling "Chernobyl" instead of the Ukrainian "Chornobyl"?

Stephen Mulvey : We use the spelling "Chernobyl" because it is the one that our readers have been accustomed to for the last 20 years, and most easily recognise. For similar reasons we spell the Ukrainian capital "Kiev" rather than the more authentically Ukrainian "Kyiv". The spelling "Chornobyl" has only been used once in a British newspaper in the last six months.

Q: How many people are made sick and die every year due to the mining and burning of coal to produce power?

Mark Kinver : An estimated 7,500 people a year are killed in coal mine accidents. About 6,000 of these lives are lost in China's mines, according to figures from the Chinese government.

There is no data on the number of deaths directly linked to burning coal. A report by the World Health Organisation concluded that, on average, air pollution shortened the life of someone living in Europe by 8.6 months – but this includes all forms of air pollution, not just emissions from coal-fired power stations.

Q: What happened to the hundreds of Soviet citizens and army personnel roped in to fight the disaster immediately after the explosion?

Stephen Mulvey : The liquidators, as they are called, came from all over the Soviet Union, from the Baltic states to Central Asia, usually on short tours of duty, about two weeks long. They came, they went, and no-one even knows exactly how many of them there were (though the figures usually given are in the hundreds of thousands) let alone how many have died.

The President of the Chernobyl Union of Ukraine, Yuri Andreev, says that according to his statistics 400,000 people from Ukraine served as liquidators between 1986 and 1990, and that of them "probably 70,000" have died. **Remember Ukraine wants to keep the accident alive for hard currency income.**

However, it is not usually possible for doctors to say that a given case of disease or death came about as a result of exposure to radiation. Large-scale studies by the World Health Organisation have suggested that there will be no more than a few thousand

additional deaths among the most severely affected groups, including liquidators and people living nearby. This would represent a rise of about 3%.

Q: What levels of radiation are the people working in the exclusion zone around the sarcophagus exposed to, per day, per month, per year?

Jim Smith and Nicholas Beresford : We are aware of data from Ukrainian scientists which shows annual doses to people living in a self-sufficient manner in less contaminated areas of the zone of up to about 7 mSv per year. Seven mSv per year is just above the EU guideline limit for exposures of air crew to cosmic radiation (6 mSv per year), and below the UK limit for exposure of the population to naturally occurring radioactivity (up to about 10 mSv per year).

Stephen Mulvey : Workers on the sarcophagus itself are limited to a dose of 20 milli-Sieverts (mSv) per year. The maximum internal dose – from inhaled dust, for example – is 3 mSv per year. Workers are limited to half an hour's work per day in the areas where radiation is most intense.

Q: How long before the area in Chernobyl is safe enough for human habitation?

Nicholas Beresford, Centre for Hydrology and Ecology : Contamination varies considerably throughout the 30 km exclusion zone. Some areas could probably be used now but in others radiation doses may remain above advised limits for some hundreds of years. Any return to the zone will require careful planning and the uses the land is put to will need to be controlled.