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Radioactive particles from Chernobyl disaster may be re-released by wildfires

Fires in forests contaminated by the Chernobyl nuclear accident could lead to areas of Europe and Russia being exposed to further radioactive fallout, new research has found. The study examined the spread of the fallout and the health effects on people and animals under three different scenarios: 10, 50 and 100% of the forests being burnt.

The forests and fields around the site of the Chernobyl disaster have changed drastically since the explosions that contaminated them — and much of Europe — with radioactive particles in 1986. Fifteen years later, with most of the area evacuated, forest coverage in the exclusion zones of Ukraine and Belarus and high contamination zones in Russia has grown from around 53% to more than 70%.

As the plants grow they absorb and store some of the contamination. This is especially true of radioactive elements such as Caesium-137, which form salts similar to those that plants normally draw up from the soil.

The increase in forest area, loss of fire prevention measures and build-up of dead plants on the forest floor together increase the risk of forest fires. This is of particular concern in this area, as fires can release the radioactive elements contained in the plants into the atmosphere. Such fires have already happened in the area; in 2002 almost 9% of forests in the exclusions zones of Ukraine and Belarus were burnt, as well as a further contaminated area near Gomel, the second-largest city in Belarus.

This research modelled how a single radioactive element released from Chernobyl, Caesium-137, would be spread by fires in contaminated forests in Ukraine, Belarus and Russia. The model was based on the frequency of real fires, as measured from satellite data, which occurred in the area and weather patterns during 2010.

Three scenarios were considered: low (10%), intermediate (50%) and extreme (100%) amounts of the contaminated forests lost to fire. The dosages and health effects that could be expected in affected populations after a year of exposure were also examined.

Following intermediate and extreme fires a significant amount of Caesium-137 would reach 5–15 million people, especially in populated areas in central and eastern Europe. If only 10% of the contaminated forests were burnt, significant and potentially harmful amounts of Caesium-137 would only reach local areas.

People living in the affected areas could expect to receive a dose of radiation ranging from 0.001 to 0.01 millisieverts (mSv) under the low scenario. If half the forests were burnt, under the intermediate scenario, this would increase to 0.05 mSv and to 0.1 mSv under the extreme scenario. To put this in context, a typical chest X-ray gives a dose of 0.06 mSv and a transatlantic flight a dose of 0.07 mSv.

The authors state that, under the most extreme scenario, this may result in an estimated excess risk of 240 people suffering cancer over their lifetime, leading to 170 deaths. However, uncertainties surrounding these estimates are high. Under the lowest scenario an estimated 10 people would die of cancer.

These results are based on a single fire event. If such fires become more frequent, as predicted under the warmer temperatures and lower rainfall caused by climate change, then exposure could increase over time. However, events such as the 'extreme' scenario are unlikely due to a range of factors, including the fact that the forests themselves are not one continuous forested area.