

Chernobyl closes – but the deadly legacy goes on

The last operable reactor at the Chernobyl nuclear plant was closed on Dec 15th, 2000. But it does not close the book on the appalling legacy left behind after the explosion 14 years ago.

Thousands of people in Belarus, Ukraine and Russia are suffering and will continue to suffer for decades from the impacts of the radiation release during the Chernobyl catastrophe. While the former Soviet Republics suffered the brunt of the disaster, its impacts can be seen across Europe; agricultural restrictions are still in place in the UK. We know that future generations will suffer genetic damage caused by the radiation, but even 14 years after the explosion the full extent of Chernobyl's hideous legacy is not known. As the radioactive substances decay over thousands of years, we are facing the possibility that the worst may still be to come.

In addition, while the closure of Chernobyl's unit No.3 has taken out one reactor, it leaves behind 13 others still operating in Russia and Lithuania. Some are even older and therefore more dangerous than Chernobyl. A further 417 commercial reactors of various designs in the world are still operable, putting the human race and the planet at the risk of a second Chernobyl.

The history

Under the leadership of the General Secretary of the Soviet Communist Party in 1970 Leonid Brezhnev ordered the construction of the first two "RBMK" reactors 50km East of Leningrad (now St. Petersburg). Two years later construction of more RBMK reactors started at Kursk, some 200 km South of Moscow and on the border of the Ukrainian and the Belarussian SSR (Soviet Socialist Republics), some 90 km North of Kiev near a little village called Chernobyl. In 1978 operation of Chernobyl reactor No. 1 started, Chernobyl-2, -3 and -4 followed in 1979, 1982 and 1984.

The reactor type

The RBMK reactor ("Reactor of Large Capacity Channels") is a graphite-moderated water-cooled Boiling Water Reactor. The RBMK design has been developed from the Soviet military reactors designed for the production of plutonium to be used in nuclear weapons. The main design problem with RBMK is that water is used not only as coolant, but also serves as neutron absorber. That means that in the case of loss or evaporation of cooling water, the reactivity in the reactor core sharply increases and can get out of control. Moreover the control and shutdown system of RBMK has serious design deficiencies. This poor design, in combination with degradation of materials and human error, makes every RBMK a time bomb.

The accident

Only two years after its completion, on April 26th, 1986 at 1:24am, the operation of Chernobyl-4 was getting out of control, hundreds of pressure tubes containing nuclear fuel

burst and the reactor exploded lifting a 1,000t concrete lid and releasing radioactive substances equivalent to at least 200 Hiroshima and Nagasaki atom bombs.

Figures on an continuing catastrophe

- 3 million children require treatment
- A total of 600,000 emergency workers who helped in the cleanup and building a cover to seal the destroyed reactor "must be constantly monitored for the effects of exposure to radiation."
- The incidence of cancer of the thyroid among adolescents jumped tenfold after the catastrophe.
- Between 1986 and 2000, 1,400 young people who were children at the time of the accident had their thyroid glands removed.
- More than three million people are registered as direct victims of Chernobyl.
- Over 2.5 million hectares of rich agricultural land have been withdrawn from cultivation.
- At present, 3.5 million people live on Ukrainian territory still contaminated by radiation - one million of them are children.
- Birth defects and growth problems in children have increased 230% in Ukraine and 180% in Belarus.
- Cases of children suffering from severe immune disorders have become two to 3 1/2 times more common.
- Those who took part in the clean up have been shown to be five to 15 times more susceptible to gene or chromosome aberrations than a control group.
- Approximately 380,000 children have an increased level of leukaemia, thyroid problems and anaemia.
- Deaths from usually non-fatal common diseases have resulted from a weakened immune system, so much so, that today the death rate in Ukraine exceeds, the birth rate.
- Ukraine has lost more than \$140 billion as a result of the Chernobyl nuclear accident.
- The Ukrainian government has already spent about \$ 5 billion to clean up the fallout from the accident..

(Sources: UN¹, Ukrainian Parliament², Ukrainian Prime Minister³; Ukrainian Ministry of Health⁴.)

There will be more than 50,000 cases of thyroid cancer caused by the Chernobyl nuclear catastrophe in the most contaminated region around Gomel among those who were children of the age of 0-4 when the catastrophe occurred. This is the result of a study last year by the International Agency for Research on Cancer (IARC) at Lyon / France, a part of the World Health Organisation (WHO).⁵

The EU-financed study speaks of a "dramatic increase in thyroid cancer" observed among those who were children and lived in territories contaminated by fall-out from the

¹ Chernobyl: A Continuing Catastrophe, U.N. Office for the Coordination of Humanitarian Affairs, April 26th, 2000

² Ukraine's parliamentary commission on Chernobyl, April 26th, 2000

³ Prime Minister Viktor Yushchenko, Interfax Russian News April 26, 2000

⁴ Ukrainian Ministry for Health Protection, Agence France Presse April 25, 2000, The Vancouver Sun April 26, 2000

⁵ Cardis, Elisabeth et al.: Observed and Predicted Thyroid Cancer Incidence Following the Chernobyl Accident – Evidence for Factors Influencing Susceptibility to Radiation Induced Thyroid Cancer; in: Radiation and Thyroid Cancer, Brussels-Luxembourg, 1999.

Chernobyl accident. Predictions of risk over life were made using age and sex-specific thyroid cancer rates from England and Wales as baseline and a multiplicative “relative risk” model. The result is an increase from 157 (1997) to 51,345 cases of thyroid cancer over the lifetime of those exposed as children to the radioactive fallout for the Gomel region. This means that 36.4% of the 141,068 Belorussians, who were between 0-4 years old and in the Gomel region when Chernobyl happened and who are now between 14 and 18 years old, will get thyroid cancer in their lifetime. The basis for this pessimistic calculation is the fact that “the discrepancies between the observed and expected numbers is outstanding, particularly in Gomel region, where the number of cases is at least ten times higher than the predictions”.⁶ Less dramatic, but still very worrying are the results from the neighboring Mogilev region where, the study predicts, 5,023 cases of thyroid cancer or 5.0% of the population of the Mogilev region of the relevant age.

More "Chernobyls" operating

Unfortunately, the closure of Chernobyl will not remove the threat of RBMKs. There are thirteen others operating across Russia and Lithuania.

Reactor name	Location	Capacity	Start of commercial operation
CHERNOBYL-3*	UKRAINE	1,000 MWe	1982
Ignalina-1	Lithuania	1,500 MWe	1985
Ignalina-2	Lithuania	1,500 MWe	1987
Kursk-1	Russia	1,000 MWe	1977
Kursk-2	Russia	1,000 MWe	1979
Kursk-3	Russia	1,000 MWe	1984
Kursk-4	Russia	1,000 MWe	1986
Leningrad-1	Russia	1,000 MWe	1974
Leningrad-2	Russia	1,000 MWe	1976
Leningrad-3	Russia	1,000 MWe	1980
Leningrad-4	Russia	1,000 MWe	1981
Smolensk-1	Russia	1,000 MWe	1983
Smolensk-2	Russia	1,000 MWe	1985
Smolensk-3	Russia	1,000 MWe	1990

Unbelievably, despite the obvious design defects of RBMKs, the Russian nuclear industry has still not abandoned these reactors. Minatom still intends to complete and start a new RBMK at Kursk while proposals are already underway to allow the reactors to operate for a further fifteen years as the reactors cores are replaced – a process known as rechannelling. Already this has been carried out at Leningrad with plans to undertake it at other power stations.

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⁶ Cardis, Elisabeth et al.: Estimated Long Term Health Effects of the Chernobyl Accident; in: One Decade after Chernobyl, Vienna 1996, page 264