

Mayak/Krasnoyarsk: Contamination and Health effects

The Russian Atomic Ministry (“Minatom”) has placed before the Russian parliament, the Duma, plans for amending Russian Environmental Law to allow the import of radioactive materials from foreign countries for final storage in Russia. But Russia’s nuclear waste storage record is disastrous, thousands of people have suffered and are still suffering from the consequences of nuclear waste management in the nuclear complexes of Mayak (Ural Mountains) and Krasnoyarsk (Siberia), two of the sites being considered for an international final repository.

As a result of both deliberate and accidental releases of radioactive materials into the environment, Mayak and Krasnoyarsk are among the worst nuclear contaminated areas in the world. Daily radioactive discharges from ongoing operations at the two facilities are still contaminating the surrounding environment. At Mayak there have been three known serious nuclear catastrophes:

- From 1949 to 1956 Mayak poured high-level liquid radioactive waste with an activity of 110,000TBq from reprocessing plants straight into the Techa River. Over 124,000 people living in settlements along the river, the main source of their drinking water, received high radiation doses.
- In September 1957 the second (after Chernobyl) biggest nuclear accident in history occurred. A steel storage tank containing 300m³ of high-level radioactive waste exploded spreading 74,000TBq of radioactivity over an area of 23,000 sq km
- In 1967 Lake Karachay, which was turned by constant discharges over 16 years into the “most polluted spot in the world”, dried up due to low rainfall. As a result, radioactive dust with an activity of 22TBq was blown over a territory of 2,700 sq km.

Release of radioactivity	TBq
MAYAK: Total releases of long lived radio-nuclides into Lake Karachay	20,000,000
Tomsk-7: liquid radioactive waste injected into the ground	15,000,000
Hiroshima bomb 1945, activity 12h after explosion	5,550,000
MAYAK: Present activity Lake "Karachay"	4,400,000
KRASNOYARSK: liquid radioactive waste injected into the ground	4,000,000
Chernobyl accident 1986	1,850,000
Releases of long lived radio-nuclides from Atmospheric bomb tests	1,550,000
MAYAK: Kyshtym accident 1957	740,000
Sellafield, UK reprocessing plant, total discharges (since 1951)*	130,000
MAYAK: Present radioactive inventory Lake "Staroe Boloto"	110,000
MAYAK: Discharges into “Techa” 1949-1956	100,000
MAYAK: Kyshtym accident 1957 spread over the region	74,000
MAYAK: Present radioactive inventory Reservoir 17	74,000
La Hague, French reprocessing plant, total discharges (since 1965)*	8,000
Tomsk-7: discharges of cooling water into river “Tom”	1,400
KRASNOYARSK: discharges of cooling water into river “Yenisey”	1,100
Tomsk-7 accident 1993	43
MAYAK: Dust spread from dried-out Lake "Karachay" in 1967	22

* excluding 3H, up to 1986

Greta Joy Dicus, Commissioner of the U.S. Nuclear Regulator Commission (NRC) stated 1998: “As a result of early operational practices and some accidents at Mayak, workers at the plant and populations around the site were exposed to unusually large amounts of radiation and radioactive materials. In

many cases, the doses were comparable to those received by survivors of the Hiroshima and Nagasaki atomic bombings.”¹

As a result of both deliberate and accidental releases, around 272,000 people have been exposed to high radiation levels. The water supplies for 124,000 people have been contaminated with high levels of radioactive isotopes, including strontium-90, caesium-137 and plutonium. According to the "Blue Book"⁽⁵⁾, which was compiled in 1992 by the Institute of Biophysics for the Russian Health Ministry, 28,000 people have been “severely irradiated” by discharges from Mayak. 8,015 have died as a result of radiation exposure and a further 935 are suffering from chronic radiation disease (CRD). An 78% increase of leukaemia has been monitored as well as an increase in the number of people dying of cancer - in particular, cancers of the digestive system, skin, bones and lungs. Skin cancers have increased fourfold over the past 33 years. According to data from the Blue Book, there was a significant increase in all types of illness among the population of the Techa region between 1980 and 1990. This includes a 21% rise in cancers and a 31% rise in vascular disease. Birth defects are up by around one quarter.

MUSLYUMOVO

People from the village of Muslyumovo, 30 km from Mayak, are estimated to receive a radiation dose of 280 MilliSievert (mSv) in the course of a lifetime. Those who have lived through the time of the massive radioactive waste discharges into the Techa River (1949-56) have received doses of 350-3,500mSv. In the United Kingdom, by comparison, the National Radiological Protection Board recommends that members of the public should receive a dose of no more than 1mSv per year.

Studies have shown that the vast majority of people from Muslyumovo suffer from at least five chronic diseases such as heart disease, high blood pressure, arthritis and asthma. Approximately half the women of child-bearing age are sterile, as are half of all men, and one-third of the babies born have some physical disorder or defect. Almost 10 per cent of babies are born prematurely and many more pregnancies end in miscarriages.²

MAYAK PLANT

According to a study kept secret for decades 83.6% of Mayak’s 1,828 workers exposed to radiation have been afflicted by chronic radiation disease (CRD) in the 1950s. The study also examines causes of death among CRD patients over 40 years - a total of 333 deaths. In the first decade, the main cause of death was acute myeloid leukaemia but, in later decades, it was lung cancer. Throughout the period, stomach cancer came second among malignancies.³

KRASNOYARSK

At the underground Krasnoyarsk Mining and Chemical Combine, one of original three Plutonium production reactors is still operational. Between 1961 and 1989 cooling water from these plutonium reactors with at least 1,100 PBq radioactivity was discharged into the river Yenisey. Although very little research has been published about radiation and health consequences from this practice, it has been reported that scientists have found in downstream villages a disturbing statistical pattern of illnesses: an increase in children with leukemia; in breast cancer among women; in genetic aberrations; and a higher death rate. All are possible effects from radiation exposure.⁴

Sources: Arctic Monitoring and Assessment Programme (AMAP), AMAP Assessment Report: Arctic Pollution Issues, Oslo 1998; Yablokov, A.V., (Editor), Plutonium in Russia, Russian Centre for Ecological Politics, 1994; Institute of Biophysics / 5

¹ Greta Joy Dicus, Commissioner, U.S. Nuclear Regulatory Commission, at the Winter Meeting of the Low Level Waste Forum, San Diego, California, February 10-13, 1998

² New Scientist, 19.03.1994

³ WISE News Service No. 408.4038 / 1994

⁴ Hoffman, David in Washington Post, 17.08.1998

⁵ Russian Ministry of Health Protection: The Blue Book, Moscow 1992; Joint Norwegian-Russian Expert Group for Investigation of Radioactive Contamination in the Northern Areas: Sources contributing to radioactive contamination of the Techa river and areas surrounding the “Mayak” production association, Urals, Russia; Osteras, Norway.

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