

## Soviet Union's polluted land

On Sept 12, 2007, the Blacksmith Institute, a US-based environmental charity, published its annual report naming the “dirty thirty”—the 30 most polluted cities in the world. Cities from the former USSR feature prominently on the list, having paid a high price for industrialisation. In view of the well-established link between environmental pollution and increased cancer incidence, an urgent need for remediation exists.

Sumgayit, Azerbaijan, is in the top ten of the Blacksmith Institute's most polluted cities. The city was a major manufacturing centre of industrial and agricultural chemicals for the USSR, where 70 000–120 000 tonnes of harmful emissions were released each year. A study done by the UNDP, WHO, the Azerbaijan Ministry of Health, and the University of Alberta, Canada, showed that the population of Sumgayit has 39% more laryngeal cancer, 67% more lung cancer, 150% more bladder cancer, and overall, 51% more cancer than the rest of Azerbaijan. Similarly, Chernobyl, in the Ukraine, continues to feature in the top ten, still polluted by radioactive dust released by the meltdown of a nuclear reactor in 1986. Since then, more than 4000 cases of thyroid cancer have been diagnosed in children, and incidence of skin lesions and breast cancer has increased in the surrounding region.

Many other former Soviet states have cities in the “dirty thirty”. For example, Mailuu-suu, Kyrgyzstan, is polluted with radioactive waste and heavy metals from uranium mining set up during the Soviet era. Consequently, twice as many people have cancer in this area than in the rest of Kyrgyzstan. The Kyrgyz Government has allocated just USD\$1.8 million of an estimated USD\$30 million needed for the clean up, with a further USD\$9 million raised through international contributions. Notably, Russia has not supported the project financially. In neighbouring Kazakhstan, Ust-Kamenogorsk is the nearest city to the notorious Semipalatinsk range, actively used by the USSR for nuclear-bomb testing in 1949–89. The city has benzoperene and lead contamination many times higher than the safe concentrations for human beings. Unlike Kyrgyzstan, no formal clean-up plan exists.

The Blacksmith Institute report only covers pollution in cities, and does not include data from rural areas of the former USSR. The need for assessment of rural areas is illustrated by the former Soviet cosmodrome, located in Kazakhstan. 50 years on since the launch of Sputnik, this

base has become the busiest in the world—handling four launches per month. Unlike other space bases worldwide, however, the cosmodrome is inland, and unburnt rocket fuel and jettisoned debris frequently lands in populated, rural areas. Unsymmetrical dimethylhydrazine (UDMH) is the most commonly used fuel, and is extremely toxic and carcinogenic. Neighbouring countries, including Russia, are also thought to be affected by atmospheric pollution from the base. Removal of UDMH from the environment is extremely difficult, and the current methods used only serve to create secondary pollution.

During the 20th century, Russia profited from the industrialisation of the Soviet Union, but it too has many consequential environmental problems. Weapon manufacture in the Cold War era has led to chemical pollution of Dzerzhinsk. Mortality exceeds the birth rate, but the cancer risks are unknown, and clean-up operations up to now have been isolated efforts. Norilsk has the world's largest smelting complex, and is badly polluted with sulphur and heavy metals. Although Norilsk Nickel has invested USD\$6.4 million to decrease emissions, the incidence of lung cancer in local residents is higher than in the rest of Russia. Russia also has four other cities in the top 30, all polluted by heavy industries, none of which have plans for remediation or figures on cancer incidence or risks. Moreover, a comparison between the 2006 and 2007 Blacksmith Institute reports suggests attempts to tackle pollution in the former USSR have been insufficient. Clearly, firm decontamination plans are needed, supported by robust quantification on the extent of the pollution risks. There are many national and international parties who should have a vested interest in this process, ranging from local, regional, and governmental agencies to private industries and international organisations.

In many of the polluted regions in the former Soviet Union, the extent of the problem is inadequately quantified and effective decontamination is difficult without outside assistance and full engagement of all interested parties. In view of the central role Russia had in the USSR, it must accept more responsibility, and, in concert with other international parties, assist with financial support and expertise to cleanse the Soviet legacy from the polluted landscapes. Stalin once boasted that he could “correct nature's mistakes”, it is now time to see if Russia can correct hers. ■ *The Lancet Oncology*



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