INSTITUTE FOR ENERGY AND ENVIRONMENTAL RESEARCH
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Prepared for the International Campaign to Abolish Nuclear Weapons/June 2022

SUMMARY OF HEALTH AND ENVIRONMENTAL IMPACTS OF NUCLEAR TESTING AT THE LOP NUR TEST SITE, CHINA

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Basic nuclear test data

China conducted 45 nuclear weapon tests, all at the Lop Nur site in Xinjiang province officially called Xinjiang Uygur Autonomous Region; 23 were atmospheric tests and 22 were underground. They ranged in explosive power from 1 kiloton to 4 megatons (CTBTO 2012). The estimated total yield of the atmospheric tests was 20.7 megatons; the fission portion of this yield is estimated at 12.7 megatons (IPPNW and IEER 1991, Table 2, p. 35), undoubtedly leading to health impacts, as indicated by the radiation dose estimates cited below.

Health Impacts and radiation doses

There are no official health studies or estimates of health impact or environmental damage due to Chinese nuclear weapons testing. There has, however, been some official indication that people died as a consequence of the testing, as indicated by the following 1989 statement of a senior Chinese military official (as quoted in IPPNW and IEER 1991, p. 151):

> Facts are facts. A few deaths have occurred, but generally China has paid great attention to possible accidents. No large disasters have happened.

No quantitative interpretation of the phase “few deaths” is possible. It should, however, be noted, that the statement that China has “paid great attention” is about accidents and does not refer to the exposure that is to be expected from the very nature of nuclear testing in the atmosphere. Some of this expected exposure is at least indirectly being acknowledged by the Chinese government: it has reportedly begun making “payments to ‘some military personnel and civilians’ who took part in nuclear tests….” (New York Times 2008)

Information about the fallout from Chinese nuclear tests was presented at a 'mini-workshop' in Beijing in 1996 under the auspices of the Scientific Committee on the Problems of the Environment (SCOPE) of the International Council for Science (ICSU), and summarised in SCOPE 1999. China’s Ministry of Health reportedly established a network of 45 stations in the early 1960s, spread across the country, for monitoring environmental radioactivity in the early 1960s (SCOPE 1999, Chapter 4, p. 74). A large peak in gross beta deposition (around 125 Bq/m^2) occurred in 1962, 2 years before China began testing, due to tests by the former Soviet Union. Soviet and U.S. atmospheric tests ceased in 1963. Smaller peaks in 1966, 1971, 1973 and 1977 were due to Chinese atmospheric tests (SCOPE 1999, Chapter 4, p. 76). Environmental contamination by I-131 following nuclear explosions was described as 'significant' in some regions such as Lanzhou, Xining and Shenyang. I-131 deposition in Lanzhou was as high as 10 kBq/m^2 after the atmospheric test on 17 June 1974; that level was also found in Xining after the atmospheric test on 16 October 1980 (SCOPE 1999, Chapter 4, pp. 76-77).

Susceptibility to high uptake of radioactive iodine was present for people of some provinces affected by fallout from Lop Nur because of low dietary iodine intakes (SCOPE 1999, Chapter 5, p. 109). Higher radiation exposure was reported in rural communities, but "potentially critical groups living in the north of China and in Inner Mongolia had not been investigated" (SCOPE 1999, Chapter 5, p. 106). Herders living in areas contaminated by fallout were likely at risk of higher radiation exposure through outdoor exposure, consuming snow meltwater and high milk intake, particularly for children (who both absorb more ingested iodine and are more radiation-sensitive than adults) (SCOPE 1999, Chapter 5, p. 109).

Outdoor air absorbed doses in urban areas between 400 and 800 km downwind of Lop Nur were measured between 0.024 and 0.45 mGy, with an average of 0.18 mGy, resulting in an estimated mean effective dose of 0.044 mSv from external irradiation (SCOPE 1999, Chapter 6, p. 159-60). Thyroid doses from internal radiation by I-131 for adults ranged from 0.06 mGy in Taiyuan to 2.5 mGy in Lanzhou; thyroid doses to infants would be about 10 times higher (SCOPE 1999, Chapter 6, p. 159-60). The average thyroid dose for the whole Chinese population as a result of the Lop Nur tests was estimated to be about 0.14 mGy (SCOPE 1999, Chapter 6, p. 160-1).

Though average deposition of strontium-90 "seems to have been lower" than in the rest of the northern hemisphere, the internal doses (mostly from tests not conducted in China) are estimated to be higher in China, related to dietary factors (SCOPE 1999, Chapter 6, p. 161).

Environmental Contamination

The Lop Nur test site is in a desertic area, as with other test sites such as the Nevada Test Site in the United States, Maralinga in Australia (UK testing) and in Algeria (French testing). The fallout from at least some Chinese atmospheric tests spread far and wide as indicated by the detection of radioactivity from a 1976 Lop Nur test in Pennsylvania (IPPNW and IEER 1991, p. 153).

The region of the Lop Nur test site in is location is rather similar to the region most impacted by atmospheric testing at Nevada: a large desertic area that nonetheless is populated by millions of people, many of who engaged in grazing activities. The total fission yield of China's atmospheric tests, the primary determinant of the amount of radioactivity in fallout out, was roughly a tenth of the tests at the Nevada Test Site (IPPNW and IEER 1991, Table 2, p. 35).

Roughly 14,000 terabecquerels of strontium-90 and 23,000 TBq of cesium-137 remain in the environment from China's atmospheric testing (IPPNW and IEER 1991, p. 153, decay-corrected to 2020) along with roughly 50 kilograms of plutonium-239. The same order of magnitude of contamination can be expected to be in the underground environment as a result of the underground tests, the last of which took place in 1996.

References

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