

# Mayak: A 50-Year Tragedy

Summary of the  
report released by  
Greenpeace Russia

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GREENPEACE

Working for Disarmament and Peace

## Contents

<b>Mayak's history of radiation accidents</b>	<b>3</b>
<b>Health impacts</b>	<b>4</b>
<b>The true cost of reprocessing nuclear waste</b>	<b>5</b>
<b>Foreign radioactive waste heading to Mayak</b>	<b>5</b>
<b>Abbreviations</b>	<b>8</b>
<b>References</b>	<b>8</b>

Greenpeace is an independent global campaigning organisation that acts to change attitudes and behaviour, to protect and conserve the environment and to promote peace.

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**Cover image: ©Eugene Pogge/Greenpeace**

Village of Muslimova is the nearest village to Chelyabinsk 65, also known as the Mayak nuclear reprocessing plant, CIS. The plant used to be a nuclear weapons factory but is now a reprocessing installation.



# Mayak: A 50-Year Tragedy: Summary of the report released by Greenpeace Russia<sup>1</sup>

29 September, 2007 is the 50th anniversary of the Mayak explosion in Russia, which caused the second largest radiation catastrophe in the world. Mayak, in the Southern Urals 1,400 km east of Moscow, is the biggest nuclear complex in the world. Although its five plutonium production reactors were closed in 1991, the plant RT-1 is still reprocessing spent nuclear fuel<sup>2</sup>. In addition, Mayak has a nuclear waste treatment plant with interim storage and pilot facilities for the production of plutonium-based Mixed Oxide (MOX) fuel and a facility for the vitrification<sup>3</sup> of liquid radioactive wastes.

In September 1957, a storage tank with highly radioactive liquid waste exploded, releasing about 740 PBq<sup>4</sup> of radioactivity into the environment, exposing 272,000 people from 217 towns and villages to chronic radiation. Until the Chernobyl disaster in 1986, it was the worst radiation accident the world had ever seen.

The radioactive fallout spread across an area 50 km wide and 300 km long. A year later, 1,000 km<sup>2</sup> was declared a closed zone, and people in that area relocated. But many people have never been evacuated. Half a century later, Mayak is one of the most radioactive places on earth, and thousands of people in surrounding towns and villages still live on contaminated land. People living in the Mayak region have chronically high rates of malignant cancers, and genetic abnormalities.

Unbelievably, rather than learning the lessons of the Mayak tragedy, the Russian government has passed legislation to import spent nuclear fuel from other countries to the Mayak complex, that would then permanently stay in the country

The anniversary of the Mayak tragedy must serve as a wake-up call to the Russian government, and to the world, of the dangers of nuclear power.

## Mayak's history of radiation accidents

The 1957 explosion was the worst accident at the Mayak nuclear complex, but it is not the only one. Since operations started in 1948, there have been a number of radiation accidents.

From 1948 to the mid 1950s, radioactive waste was poured straight into the Techa River, the source of drinking water for thousands of people. The 110 PBq of radioactivity released exposed 124,000 people in 41 surrounding towns and villages. 7,000 people in the villages of Muslyumovo, Brodokalmak, Russian Techa, and Nizhnepetropavlovskoe have never been relocated.

In the spring of 1967, a storm blew nuclear dust containing more than 18 PBq of radioactivity from Karachay Lake, one of the reservoirs used to store waste from nuclear reprocessing. The contamination spread across 2,700 km<sup>2</sup> affecting 42,000 people, living in 68 towns and villages.

## Location of the FSUE 'PE Mayak'



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## Health impacts

Today, around 7,000 people still live in direct contact with the highly polluted Techa River and on contaminated land.

A recent study by Greenpeace Russia<sup>5</sup> found malignant cancers among local people in the town of Muslyumovo are significantly higher compared to the rest of Russia. Official data<sup>6</sup> shows the number of Muslyumovo inhabitants on the national oncology register, is 3.6 times higher than the Russian average.

Another study<sup>7</sup> finds that genetic abnormalities are 25 times higher in Muslyumovo than in other areas. Expert opinion considers this a consequence of living on land contaminated by high levels of radioactivity.

In May 2007, Rosatom, the Russian Atomic Energy Agency, announced a “resettlement” project for some inhabitants of Muslyumovo<sup>8</sup>. However, lack of funds means only those people living in close proximity to the river will be moved. Moreover, rather than being evacuated out of Muslyumovo, they are only being relocated to other parts of town. The drinking water in so-called “New Muslyumovo” contains levels of radioactivity two to three times higher than what is considered safe by Russian official standards<sup>9</sup>.

**Table 1. Radionuclide content in the sample of fish, fished out of the Techa river**

Radionuclide	Meat	Bones	Organs
Sr90 Bq/kg	215+/-15	2700+/-50	95+/-10
Cs137 Bq/kg	93+/-4	1400+/-60	690+/-30

**Table 2. Hygienic demands for food safety according Sanitary Norms and Rules of Russian Federation 2.3.2.1078-01**

	Sr90 Bq/kg	Cs137 Bq/kg
Live fish, fresh fish, frozen fish	130	100

**Table 3. Results of laboratory tests of drinking water from wells in Muslyumovo**

	Total alpha activity, Bq/l	Total beta activity, Bq/l
Hole No 4122, settlement Muslyumovo	0.336	-
Hole without number, Muslyumovo station	0.2	1.26-2.08
Standard, Bq/l	0.1	1.0

Mayak, Russia.  
Woman holding  
up document to  
camera with details  
of her radiation  
illness.



©Greenpeace/Sabine Vainio

## The true cost of reprocessing nuclear waste

One part of the Mayak complex, the RT-1 plant, has been reprocessing spent nuclear fuel since 1976. As with similar large scale reprocessing factories in the UK, France or Japan, the volume of radioactive waste is, through the process, actually increased thousands of times over.

Reprocessing one tonne of spent nuclear fuel creates the following extra amount of liquid radioactive waste.

- Highly radioactive category (activity up to 370 GBq/l<sup>10</sup>) - about 45 cubic metres (m<sup>3</sup>)
- Medium-level radioactive (activity up to 37 GBq/l) - about 150 m<sup>3</sup>;
- Low-level radioactive (activity up to 370,000 Bq/l) - about 2,000 m<sup>3</sup>.

About 140 tonnes of spent fuel is reprocessed at Mayak every year. The majority of the liquid waste is disposed of into nearby ponds. 5-6 million m<sup>3</sup> of radioactive waste seeps from these ponds into in the Techa river every year.

In 2002, Gosatomnadzor, the Russian Nuclear Regulatory Agency refused to issue Mayak a licence for the storage of liquid radioactive wastes in the system of Techensky cascade reservoirs at Techa River.

The official note states<sup>11</sup>:

*“The Gosatomnadzor decision taken on the 19th December 2002 is that Mayak was not given the permission for operation of the complex with nuclear materials designated for radiochemical reprocessing of the irradiated nuclear fuel (factory 235) because the Mayak reprocessing factory keeps dumping medium- and low-level radioactive wastes into open water bodies (violation of article 51 of Federal Law “About environmental protection”, art. 104 of Water code of Russian Federation, art. 48 of Federal law About atom energy use).”*

## Foreign radioactive waste heading to Mayak

The Mayak complex reprocesses spent fuel not only from Russia, but also imported from other countries. According to official figures, by 2001 Mayak had reprocessed 1,540 tonnes of foreign spent nuclear fuel<sup>12</sup>. As a result of this, over 3 million m<sup>3</sup> of liquid low-level and middle-level radioactive wastes was generated and pumped to the leaking ponds. Over 70,000 m<sup>3</sup> of foreign highly radioactive wastes remains stored at the Mayak facility.

A second factory capable of processing spent fuel from Western reactors is also being constructed in the Krasnoyarsk region of Russia. Financed by the Russian federal budget, this experimental facility will be operating before 2015.

In 2001, the Russian government overturned a ban on the import of nuclear waste from other countries for storage. It also adopted legislation to allow for any reprocessed waste to remain in Russia permanently, whereas before it was obligatory for those countries sending the waste to take it back.

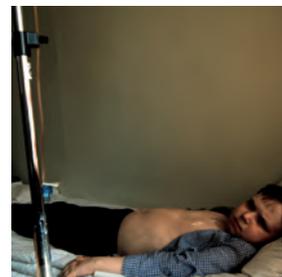
Rosatom hopes that these new conditions will attract contracts with Bulgaria, Hungary and Slovakia, who together with the Czech Republic, have signed an agreement with Russia, opening the possibility for future reprocessing contracts. Other countries Rosatom are pursuing as potential customers are Switzerland, Germany, Spain, South Korea, Slovenia, Italy and Belgium.

Nuclear fuel reprocessing in Russia and other places creates massive generation of radioactive waste, environmental contamination and accumulation of plutonium, which can easily be used for nuclear weapons.

None of the countries shipping their dirty nuclear waste to Russia would allow Mayak to continue operating on their own land. They are exploiting Russia's lack of environmental and health standards to dump their radioactive waste on people who have already suffered the devastating consequences of nuclear contamination for half a century.

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Child from the  
Mayak area in  
Cheljabinsk  
Hospital  
cancer ward.



©Greenpeace/Sabine Meinro

Mayak is a horrific example of the true face of the global nuclear industry. The Mayak anniversary must serve as a wake up call to the world about the real costs of nuclear power, at a time when the nuclear industry is desperately trying to make itself relevant by manipulating the climate crisis, aggressively promoting itself as a low-cost mature technology.

Mayak's half-century of contamination history exposes the dirty side of the nuclear spin. If people fall for nuclear spin, then the so-called nuclear renaissance becomes another threat of climate change.

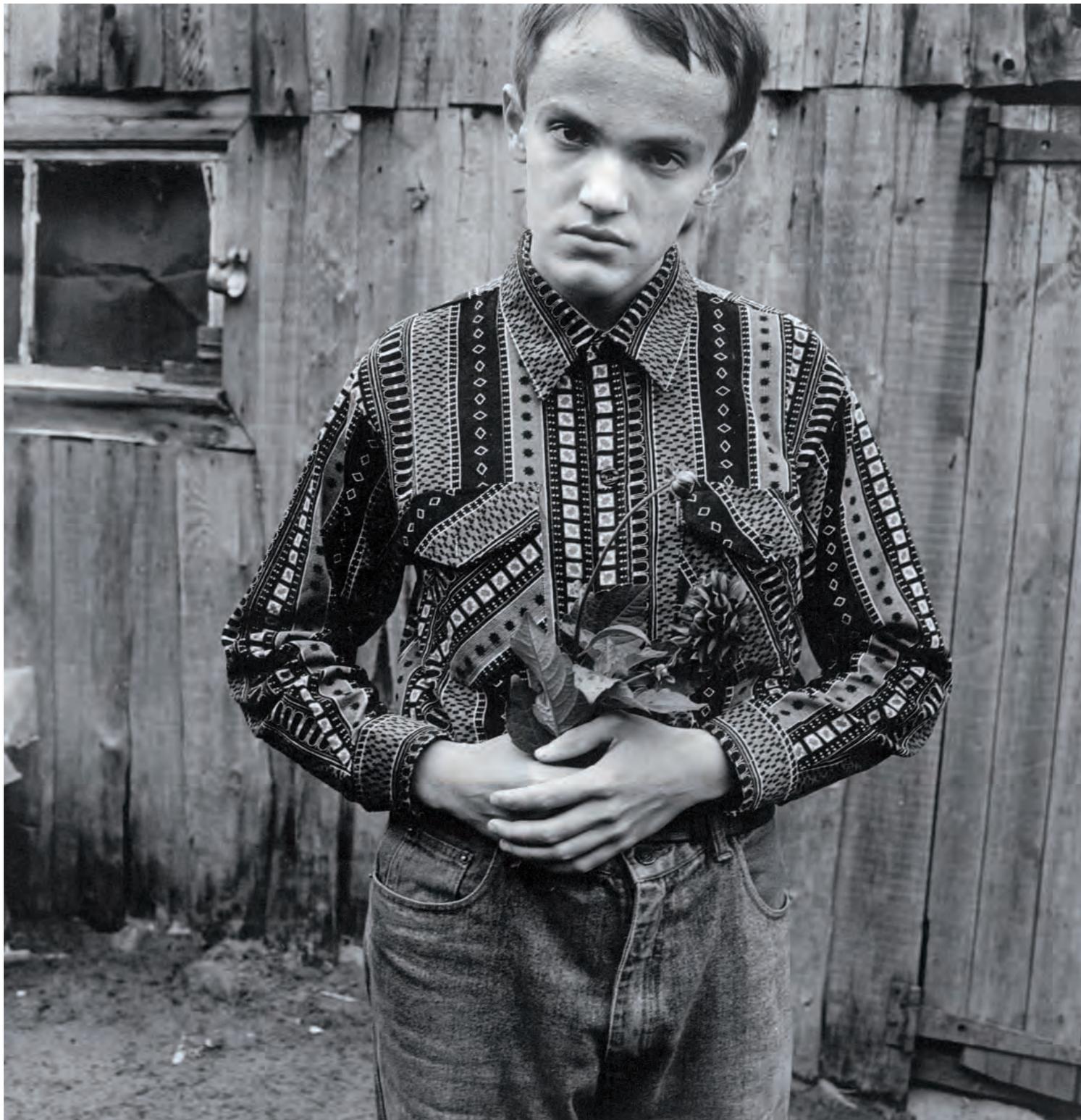
Nuclear power undermines the solutions to climate change. Investment in this outdated, deeply dangerous and costly technology diverts resources away from the true solutions to the climate crisis, renewable technologies and energy efficiency.

Greenpeace's Energy [R]evolution blueprint<sup>13</sup> demonstrates that, by 2050, it will be possible to reduce carbon dioxide (CO<sub>2</sub>) emissions from the energy sector by more than 70% compared to 1990 levels and phase out nuclear power entirely.

With nuclear power and fossil fuels phased out, economic development, energy security and global equity can be truly promoted.

**Table 4. Reprocessing of SNF at “Mayak”**

	SNF volume (tones of heavy metal)	Highly radioactive liquid wastes, m <sup>3</sup>	Middle-level radioactive liquid wastes, m <sup>3</sup>	Low-level radioactive liquid wastes, m <sup>3</sup>
Bulgaria	331.5	14 918	49 725	663 000
Hungary	269.3	12 119	40 395	538 600
Czechoslovakia	80.5	3 623	12 075	161 000
Finland	311.7	14 027	46 755	623 400
Germany	235.0	10 575	35 250	470 000
Ukraine	314.2	14 139	47 130	628 400
Iraq	0.12	5.4	180	240
<b>Total</b>	<b>&gt; 1542</b>	<b>69 390</b>	<b>231 300</b>	<b>3 084 000</b>



**To Mr Kasiianov, prime minister of the Russian Federation.**

*"My name is Ramzis Fayzullian. I was born disabled. At present I am 16 and as any other boy of my age I go to school, but I feel bad at school, because the boys are calling me bad names. I fall ill very often. It hurts to know that I am not like the others. And I want to be like the others. I want to look as good as they do. I want to court girls, but they shun me and refuse to go out with me. I do not want to have children who look like me. That is why I am against any import of radioactive waste from foreign countries. If ministers and the others want money, why do they not build nuclear power plants in the Moscow region or right in Moscow?"*

*"We have suffered from radiation so much that almost every week someone in our village dies from cancer. So, why don't the members of parliament think well before they permit nuclear waste into the country? Please, think about our future."*

September 2001,  
KURMANOVA/RUSSIA  
Ramzis Fayzullin,  
Age 16, wrote a letter to the Duma,  
the Russian parliament, to ask them  
not to give permission for the  
import of nuclear waste.  
He has problems with pressure  
building up in his head  
(Hydrocephalus) and has to take  
expensive medication to regulate this.  
He suffers major head aches and  
is not allowed to fly.

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## References

- <sup>1</sup> 'Mayak: A 50 Year Tragedy' Russian version available from <http://www.greenpeace.org/russia>
- <sup>2</sup> RT-1 processes spent nuclear fuel from VVER-440 reactors, fast-breeder reactors, nuclear submarines and icebreakers.
- <sup>3</sup> After reprocessing, highly radioactive waste is heated to produce a powder, which is then mixed with glass to encapsulate the waste, a process called vitrification.
- <sup>4</sup> petabecquerels; 1 PBq = 10 (upper index) 15 Becquerels; Becquerel is a unit of radioactivity and represents one radioactive decay (leading to a release of radiation) in the given object per second.
- <sup>5</sup> Results of poll conducted by Greenpeace Russia with inhabitants of Muslyumovo, 2002.
- <sup>6</sup> Copy of letter of Administration of Cheljabinsk District of 18 December, 2000, No. 08/3653
- <sup>7</sup> 'Citogenetical Research of inhabitants of Muslyumovo', Institute of General Genetic Russian Academy of Science, Moscow, 1998.
- <sup>8</sup> [http://www.rosatom.ru/en/news/4867\\_31.05.2007](http://www.rosatom.ru/en/news/4867_31.05.2007)
- <sup>9</sup> Copy of letter of Territorial Division of the Administration of Federal Service for Inspection in the Area of Protection of Consumer Rights and Human Well-being for Cheljabinsk Region in Sosnovsky and Argajashsky, Kunashaksky Regions No. 272 of 25 May, 2007.
- <sup>10</sup> Gigabecquerel; 1 GBq = 10<sup>9</sup> Becquerels
- <sup>11</sup> Official note from Gosatomnadzor No. 3-13/701, dated 20 December, 2002
- <sup>12</sup> Analysis of arrangement and efficiency of works on fulfilment of applicable international agreements of the Russian Federation related to import, storage and reprocessing of irradiated nuclear waste of foreign nuclear reactors. Prepared by the Government of the Russian Federation for fulfilment of instruction of the President of the Russian Federation of 4 February, 2002, No. Pr-251.
- <sup>13</sup> <http://www.energyblueprint.info>