



International POPs Elimination Project

*Fostering Active and Efficient Civil Society Participation in
Preparation for Implementation of the Stockholm Convention*

Development of an Action Plan for Reducing the Exposure to POPs Among Natives of the Russian Arctic

Measures to Reduce Adverse Impacts of Persistent Toxic Substances on Health of Indigenous Peoples of the Russian Arctic

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About the International POPs Elimination Project

On May 1, 2004, the International POPs Elimination Network (IPEN <http://www.ipen.org>) began a global NGO project called the International POPs Elimination Project (IPEP) in partnership with the United Nations Industrial Development Organization (UNIDO) and the United Nations Environment Program (UNEP). The Global Environment Facility (GEF) provided core funding for the project.

IPEP has three principal objectives:

- Encourage and enable NGOs in 40 developing and transitional countries to engage in activities that provide concrete and immediate contributions to country efforts in preparing for the implementation of the Stockholm Convention;
- Enhance the skills and knowledge of NGOs to help build their capacity as effective stakeholders in the Convention implementation process;
- Help establish regional and national NGO coordination and capacity in all regions of the world in support of longer term efforts to achieve chemical safety.

IPEP will support preparation of reports on country situation, hotspots, policy briefs, and regional activities. Three principal types of activities will be supported by IPEP: participation in the National Implementation Plan, training and awareness workshops, and public information and awareness campaigns.

For more information, please see <http://www.ipen.org>

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The project is a continuation of the already existing collaboration between the North-western Centre of Hygiene and Public Health (NWPHRC) and the Russian Association of Indigenous Peoples of the North (RAIPON) concerning environmental risk factors in the Arctic. The main objective of this project is to elaborate a scientifically sound, economically feasible and publicly accessible action plan to reduce the high loads of organic contaminants in Arctic Indigenous Peoples in Russia that appear to be causing reproductive problems.

1. Introduction

Global intensification of industrial and agricultural activities resulted in environmental releases of qualitatively new highly toxic chemicals, so called xenobiotics. Many of these chemicals are extremely stable in environmental media and are prone to bio-accumulation in fat tissues and the internal organs of animals and human beings. Development and application of many of these chemicals are prohibited by the Stockholm Convention that became effective in 2004, including *inter alia* polychlorinated dibenzodioxins/furans, polychlorinated biphenyls, and some organochlorine pesticides (DDT, chlordane, toxaphene, etc.). Besides the above listed chemicals, some highly toxic metal compounds also have similar properties (e.g. compounds of mercury, lead, cadmium, etc.).

Due to specific climate conditions of atmosphere flows in the Northern hemisphere, many toxic substances that are transferred by air flows to Arctic regions from middle latitudes, intensively accumulate in environmental media of Arctic regions. Actually, subpolar areas operate as a "cold trap" for different PTS. For example, in spring/summer seasons, up to 50 tons of mercury precipitates in these territories every month. More than 65% of this precipitation occurs within the territory of the Russian Arctic. In the territory of Murmansk Oblast and Nenetskiy Autonomous District, long-range air transfer processes result in fallout of about 3 tons of mercury, 1 ton of PCBs and 1.1 ton of γ -hexachlorocyclohexane (HCH). In Yamalo-Nenetskiy and Taymyrskiy autonomous districts, annual fallout of mercury reaches 15 tons, while the fallout of PCBs reaches 3.2 tons. Almost all major rivers of the two largest continents (Eurasia and Northern America), as well as the main sub-tropical and midlatitude ocean currents of the Atlantic and the Pacific (recipients of highly polluted river drainage) transfer polluted water to the Arctic region. PTS levels in sea animals and fish suggest that intensity of transfer of PTS by ocean currents to the Russian Arctic is fairly high however no quantitative estimates have been made yet. Some isolated estimates suggest that the monthly inflow of PCBs from the Pechora River and the Yenisey River may reach up to one ton in high water seasons.

Besides intensive global transfer and accumulation of pollutants in environmental media of the Arctic, there are some other specifics of the Arctic regions that facilitate adverse health impacts of these pollutants. For example, extremely low air/soil temperatures at the ground level and lengthy periods of snow cover substantially reduce circulation of surface water and groundwater. These factors reduce the velocity of chemical reactions in environmental media and biota and thereby reduce self-decontamination capacity, including *inter alia* substantial reduction of intensity of biological (microbial) degradation and assimilation of pollutants. In addition, the high proportion of fat in the traditional diets of Indigenous Peoples of the North promotes excessive human intake of PTS, as the majority of them are fat soluble.

Besides contamination of environmental media due to global processes, local pollution sources also play a major role in areas of the Far North. These sources are mainly associated with the results of long-term practices of so called "Northern delivery" of fuel, different technical

equipment and food for maintenance of economic activities and human consumption. In regions of the Far North, many millions of tons of obsolete packaging, waste equipment, solid and liquid waste are accumulated.

In addition, in these areas, indoor areas of public and residential buildings, food storage, processing and cooking facilities are heavily contaminated by PTS.

Eventually, all the above factors of higher risks of adverse PTS impacts are closely linked to the high concentrations of these chemicals in blood of Indigenous Peoples of the Far North in breast milk and in cord blood of newborn children. For example, average levels of organochlorine compounds such as PCBs, Lindane and DDT, as well as levels of mercury and lead in the blood of Indigenous Peoples of coastal areas of the Russian Arctic are more than 10 times higher than relevant levels in the blood of residents in major Russian cities. Average levels of some banned pesticides in the cord blood of newborn children of coastal areas of Chukotskiy Autonomous District are comparable to blood levels of children from cotton-producing regions near the Aral Sea (the latter territory is known as an area of environmental disaster).

High concentrations of PTS in blood were found to cause extremely serious adverse impacts on human health, affecting nervous, endocrine and immune systems, reproduction and embryonic development processes. Some toxic substances act as hormone-imitators; they suppress production of natural hormones and disrupt hormone-regulated processes such as spermatogenesis, ovulation, and sexual development. Besides that, hormonal misbalance is known to facilitate cancer. The majority of persistent organic substances are soluble in fat and they cross the placental barrier easily and affect foetal development processes. As a result, children may suffer adverse effects that were not observed in their parents.

2. Underlying laws and regulations for the measures recommended:

1. Federal Law on Environmental Protection of 10.01.2002, No. 7-FZ 2002.
2. Federal Law on Sanitary and Epidemiological Wellbeing of the Population of 30.03.1999, no. 52-FZ (as amended on December 30, 2001, January 10 and June 30, 2003, August 22, 2004).
3. Federal Law on Main Guarantees of Rights of the Child in the Russian Federation of July 24, 1998, No. 124-FZ.
4. Federal Law on Main Provisions of Occupational Safety in the Russian Federation of July 17, 1999, No. 181-FZ.
5. Federal Law on Technical Regulation of December 18, 2002, No. 245-FZ;
6. Federal Law on Quality and Safety of Food Products of January 2, 2000, No. 29-FZ;
7. The Water Code of the Russian Federation, date of approval October 18, 1995.
8. "Sanitary Protection Zones of Water Supply Sources and Drinking Water Distribution Networks" in *"Sanitary Rules and Norms SanPiN 2.1.4.1110-02*. (made effective by Decree No. 10 of the Chief Sanitarian of the Russian Federation of March 14, 2002);
9. Sanitary Standards for Pesticide Levels in Environmental Media (list). GN 1.2.1323-03. the Public Health Ministry of Russia, Moscow. 2003.
10. Hygiene Requirements to Safety and Nutrition Value of Food Products. SanPiN 2.3.2.1078-01. the Public Health Ministry of Russia, Moscow. 2002.
11. Hygiene Requirements to Safety and Nutrition Value of Food Products. SanPiN 2.3.2.1280-03. Amendments No. 2 to SanPiN 2.3.2.1078-01. the Public Health Ministry of Russia, Moscow. 2003.

12. Decree No. 426 of the Government of the Russian Federation on Approval of the Regulations of Socio-hygiene Monitoring of 01.06.2000.
13. Sanitary Supervision at Facilities - Sources of Pollution of Environmental Media in the Far North Areas. Methodological Recommendations. No. 01-19/142-17, approved by G.G.Onistchenko on 12.12. 1995. Moscow. 1996.

3. Key principles of mitigation and prevention of adverse impacts of PTS on health of residents of the North.

3.1. Mitigation and prevention of the toxic impacts of PTS should be comprehensive since Indigenous Peoples run higher health risks due to exposure particularly to polychlorinated biphenyls (PCBs), organochlorine pesticides, and lead and mercury. In addition, Indigenous Peoples of the Arctic experience diverse routes of exposure including long-range transfer (ocean currents, rivers, air circulation in the atmosphere), local sources (polluted areas of some human settlements) and contact sources (indoor pollution).

3.2. Measures for prevention and mitigation of pollution of environmental media should incorporate additional sanitary and hygiene requirements to regulation of economic activities in areas of traditional residence of Indigenous Peoples. Such measures should stipulate:

- preferential application of no-waste/low waste technologies by transportation and production facilities;
- restrictions for construction and operations of facilities, that generate poorly recyclable waste;
- establishment of efficient systems for utilisation of hazardous waste, including PTS-containing waste and imposition of limitations for application of waste neutralisation technologies that rely on natural self-decontamination capacity of the environment;
- sanitary improvement of already existing storages of industrial and transportation waste;
- development of methods for soil decontamination in territories of human settlements and subsistence agriculture plots, contaminated by PTS;
- development of rational and environmentally sound water use systems;
- introduction of organisational arrangements for efficient control of safe application of chemicals for protection of buildings, animals and plants from insects and rodents by households and industrial facilities;
- replacement of lead-containing hunting ammunition and fishing gear by safe metal-plastic composite materials;
- development of methods for decontamination of residential and industrial buildings, contaminated by PTS;
- development of recommendations for Indigenous Peoples on the safe consumption of traditional food products including their storage and cooking particularly for women (including pregnant women, nursing mothers and women who are planning to become pregnant);
- development of recommendations for medical personnel of prenatal care facilities and maternity wards of clinics on provision of health care services to mothers and the newborn;
- hygiene education of adolescents - development of relevant school curricular courses (e.g. in the framework of safety lessons).

4. Collection, neutralisation, transportation of potentially hazardous PTS-containing waste

4.1. First of all, measures for prevention of the adverse impacts of PTS on the health of Indigenous Peoples should stipulate organisation of regular waste removal from residential areas of traditional settlements in compliance with environmental, sanitary, epidemiological and other requirements.

4.2. It is necessary to ensure commissioning of waste disposal facilities based on permits and issued by specially authorised federal bodies after review of results of special geological, hydrological, sanitary and chemical reviews, and after consultations with local self-government bodies and organisations and legal representatives of Indigenous Peoples.

4.3. Owners/operators of waste disposal facilities are obliged to maintain ambient monitoring in the territories of these sites and within their environmental impact zones, according to established procedures; besides that, they are obliged to organise and maintain control of compliance with the due waste management legislation of the Russian Federation.

4.4. It is recommended to ban disposal of PTS-containing waste in the territories of settlements of Indigenous Peoples; within water protection zones; in watershed areas of underground water bodies that are used for drinking water supply and technical water supply; in places of surface outcrops of fractured rock; near outcrops of underground aquifers; and closer than a distance of 500 m from childcare and public health facilities.

4.5. Depending on the associated health and environmental impacts, different types of hazardous waste are subdivided into several hazard classes (according to criteria in Table 1.)

Table 1. Hazard classes of PTS-containing waste

Hazard classes	Chemicals
1	Arsenic, cadmium, mercury, lead, selenium, zinc, fluorine, benz(a)pyrene, organochlorine pesticides, polychlorinated biphenyls.
2	Vanadium, barium, boron, cobalt, nickel, manganese, copper, antimony, chromium.
3	Tungsten, molybdenum, strontium

4.6. Waste disposal facilities for solid municipal waste are made as specialised sites for isolation and neutralisation of solid municipal waste, and these sites should guarantee sanitary and epidemiological security of Indigenous Peoples. Waste disposal sites may be organised in settlements of any size. It is recommended to establish centralised waste disposal sites for groups of human settlements.

4.7. Operations of burial and neutralisation of waste sludge, solid and liquid industrial and transportation PTS-containing waste should be made at specialised sites, ensuring efficient protection from environmental releases of pollutants. Operators of waste disposal sites should develop operational regulations, waste reception instructions; they should ensure control of waste composition, register waste deliveries and ensure compliance with technical regulations on waste isolation and utilisation.

5. Measures to prevent PTS contamination of soils at territories of human settlements in Arctic regions

5.1. Soil contamination hazards can cause adverse impacts on the environment (water, air, food) and direct/indirect impacts on human health depending on the biological activity of soils and natural self-decontamination processes.

5.2. It is recommended to assess the sanitary and environmental risks of contaminated soil with laboratory testing including estimation of PTS levels in territories of human settlements.

5.3. Laboratory tests for assessment of sanitary and environmental quality of soil should be primarily conducted in residential areas, within sanitary protection zones of surface water bodies and near childcare and public health facilities, etc.

5.4. If soil levels of hazardous substances in human settlements exceed recommended standards, it is necessary to develop special measures for rehabilitation and neutralisation of soils, protection of watershed areas, and prevention of health problems, that may be associated with specific soil contaminants.

5.5. It is recommended to organise systemic monitoring of soil contamination and efficiency of actions being made for soil rehabilitation and neutralisation.

6. Ensuring safety of water bodies, drinking water and drinking water supply

6.1. Water bodies that are used for drinking water supply and technical water supply should not be sources of biological, chemical and physical factors of adverse impacts on human health.

6.2. Use of water bodies for residential drinking/technical water supply should be allowed only provided issuance of sanitary and epidemiological certificates, confirming that these bodies meet sanitary and epidemiological safety requirements.

6.3. Criteria of safety of water bodies for human health (including MACs; maximal allowable concentrations) for persistent toxic substances) are established at least according to relevant hygiene standards (see Table 2). The goal concentration for all PTS and toxic metals should be zero.

6.4. Discharge limits should be set for every individual discharge and every pollutant, based on the criteria, that concentrations of these pollutants in a water stream cross-section at the distance of 500 m downstream from the discharge point are lower than relevant standards.

6.5. All products that are used in the sector of drinking water supply and hot water supply should undergo mandatory testing for their sanitary and epidemiological safety for human health, including the following ones:

- reagents that are added to water;
- equipment and construction materials (pipes, water storage and transportation tanks and chemicals, used for treatment of their inner surfaces);
- water filtering and conditioning materials (filters, ion-exchange resins, membranes, sorbents);

Table 2. Limits for PTS in drinking water (sanitary and toxicological requirements)

Pollutants	Units of measure	Russian Standard limits	Hazards classes
Hexachlorobenzene	<i>mg/l</i>	0.0010	2
Cadmium	<i>mg/l</i>	0.0010	1
Polychlorinated biphenyls	<i>mg/l</i>	0.0010	1
Mercury	<i>mg/l</i>	0.0005	1
Lead	<i>mg/l</i>	0.0100	1
2,3,7,8-tetrachloro-dibenzo-dioxin	<i>ng/l</i>	20	1
Benz(a)pyrene	<i>ug/l</i>	0.0100	1

6.6. Particular attention should be paid to local contamination of water sources. In the case of lack of alternative sources of drinking water, it is recommended to use modern water treatment technologies to reduce water levels of toxic metals and organochlorine compounds (membrane filters, selective sorbents). Many Russian and foreign manufacturers produce efficient water treatment equipment. The equipment ensures efficient removal of heavy metals, arsenic, fluorides, boron, phenols, suspended matter, microorganisms, oil derivatives and pesticides. Water treatment installations may be used in the field, for water supply of villages, townships or industrial facilities.

7. Measures to prevent indoor pollution by hazardous chemicals

7.1. In the course of development of new household chemicals, associated methods of packaging, storage, transportation, sale and utilisation of these chemicals, relevant requirements should be developed to ensure sanitary and epidemiological safety of residential consumers.

7.2. All chemical preparations and products for household use should not contain PTS that, if contacted, may pose risks of uncontrolled health impacts.

7.3. If, in process of storage and use of products, materials and items, they may alter their properties and pose health risks, limits for shelf life of these products, materials and items should be imposed.

7.4. Parameters of sanitary and epidemiological safety of new household chemicals, their shelf life, requirements to their packaging, marking, transportation, storage, utilisation, production processes, testing methods, methods of utilisation or elimination should be incorporated into special technical regulations.

7.5. Chemical products for household use should be packed in a way to ensure their sanitary and epidemiological safety. In addition to information that is required by the due legislation of the Russian Federation on consumers' rights, labels or inserts of these products should contain information in the Russian language that specifies the information below. Note that according to the national legislation chemical components have to be listed in the papers that accompany chemical products for household use.

- purposes of use, storage and use conditions, potential health risks associated with incorrect use of a product;
- precautions and first aid measures, recommended in the case of symptoms associated with adverse health impacts of the products;
- utilisation and neutralisation measures;
- date of manufacture and date of packaging of the product.

7.6. If, in the course of storage and transportation of chemical products for household use, some relevant requirements were not complied with and these products obtained some hazardous properties, individual entrepreneurs and legal entities in charge of these storage and transportation operations are obliged to inform owners and recipients of these products about these matters.

7.7. Retail sale facilities are not allowed to sell unpacked chemicals and chemical products without necessary associated information (see clause 5.).

7.8. Chemical products for household use that may pose health risks in the course of their use are subject to mandatory registration and certification, according to the due legislation of the Russian Federation.

7.9. In the case of PTS contamination of indoor surfaces of residential and public buildings, items, equipment and contact surfaces in occupied areas, they should be decontaminated/neutralised according to recommendations, approved by state sanitary supervision bodies.

7.10. In all regions of the North, risks of adverse health impacts of PTS are associated with intensive contamination of indoor environment of residential and public buildings, as results of a special study suggest that the majority of these building are heavily contaminated by persistent organochlorine compounds, lead and DDT.

7.11. Strict procedures and approved methods have been developed for neutralisation of mercury and lead contamination of indoor areas - these operations should be conducted under supervision of local facilities of the State Sanitary and Epidemiological Service (*Sanitary Rules: "Hygiene Requirements to Lead Handling Operations" SP 2.2.5.780-99. M. The Public Health Ministry of Russia. Official publication; Sanitary Rules for Handling of Mercury, Mercury Compounds and Mercury-containing Instruments" SP No. 4607-88 M., The Public Health Ministry. Official publication; State Standard GOST 12.3.031-83 "Mercury Handling. Safety Requirements")*);

7.12. As for persistent organochlorine compounds, now, in Russia, there are no officially approved methodologies for their neutralisation in residential and public buildings. In order to remove these substances from tableware, furniture, indoor surfaces, it is recommended to use 2-stage washing (with an interval of about 30 minutes) by a warm 0.5% solution of surfactants with dispersing biological additives and proteolytic enzymes. After completion of the above treatment, cleaned surfaces should be washed by warm clean water and dried with a cloth. Washing water and cloths should be removed from indoor areas, according to recommendations on neutralisation of PTS-containing waste (see the relevant section).

8. Monitoring of PTS in traditional food products

8.1. Suggested safety requirements for limits of levels of toxic substances should be applied to all types of raw food and food products, including traditional objects of hunting/fishing of Indigenous Peoples. Native food is irreplaceable for Indigenous Peoples. It contains important nutritional support, microelements and vitamins. Venison and meat of wild animals and birds is a valuable source of iron and protein. Facing lack of imported products Indigenous Peoples consider native foods as the only way to support healthy lifestyle in the Arctic. Besides that one has to keep in mind the cultural and traditional aspect of this problem – if Indigenous Peoples stop consuming native foods they will lose their cultural identity.

8.2. Priority pollutants under regulation for purposes of ensuring sanitary and epidemiological safety of traditional food products incorporate:

- Mercury
- Cadmium
- Lead
- Organochlorine pesticides
- Polychlorinated biphenyls

Food products that contain concentrations of benz(a)pyrene over detection limits of modern analytical instruments should not be used for consumption by children.

8.3. It is recommended to maintain systemic control of regulated persistent toxic substances in all types of raw food and food products, according to procedures stipulated by the due legislation of the Russian Federation.

8.4. Sanitary and epidemiological assessment of raw food and food products should be conducted in compliance with the due hygiene standards, with mandatory estimation of levels of pesticides, including isomers of hexachlorocyclohexane, DDT and its metabolites.

- Polychlorinated biphenyls accumulate in fish, meat and fat of sea animals, fish and other sea food; 3,4-benz(a)pyrene accumulates in grain, smoked meat and fish.
- mercury, cadmium and lead levels should be measured in fish, in animal meat and internal organs (besides that, levels of these metals should be separately estimated in kidneys of animals).

8.5. It is recommended to maintain periodical monitoring (at least 2 times/year) of other highly toxic substances in main traditional food products of Indigenous Peoples (in the case of toxic substances subject to legislatively set limits for levels in raw food and food products).

9. Measures to reduce risks of PTS contamination of traditional food.

9.1. Available estimates suggest that daily intakes of PTS by adults (per 1 kg bodyweight) with food (main types of fish, animal meat and fat) do not exceed recommended limits. However, these estimates do not account for four key factors that affect adverse impacts of PTS consumed with traditional food:

- Estimates are based on data for wet fish and animal meat in natural conditions. Sampling methods excluded storage and cooking of food - as a result, these samples can hardly contain substantial amounts of secondary pollutants (however, in the majority of cases, secondary pollutants represent the key source of human intake of PTS with food).
- Depending on income levels and intensity of individual physical loads, consumption of local food products may substantially differ. In some cases, individual persons may

consume up to 150 g fat/day or 2.5 - 4 times higher than the average fat consumption by Indigenous residents (fat contains about 90% of all PTS of a daily human intake).

- Different cooking methods may result in an increase or decrease in fat level in processed food (see Table 3). Levels of fat soluble PTS in food change correspondingly;
- In the case of particularly vulnerable groups of Indigenous Peoples (e.g. women of reproductive age and children under 18 years old), it is recommended to reduce limits of PTS daily intake by 2-fold (*Toxic substances in the Arctic and associated effects – Human Health*. 2003. //J. Van Oostdam, S. Donaldson, M Freeley, N. Tremblay /Eds./, Ottawa, ON, Canada. 127 p.).

Accounting for the above considerations, traditional foods of Indigenous residents of the Russian Arctic cannot be assessed as absolutely safe, even in the case of complete prevention of secondary food contamination in the course of food transportation, storage and cooking.

Table 3. Fat content (%) in some traditional food products

Traditional food products	Cooking/processing methods	Average fat content (%)
Salmon	Charqued, smoked	22
Walrus meat	Charqued	12
Seal meat	Charqued	9
Bear meat	Charqued	10
Reindeer meat	Charqued, smoked	8
Salmon	Boiled	6
Bear meat	Boiled	4
Seal meat	Boiled	2
Reindeer meat	Boiled	2
Whale meat	Boiled	3

10. Prevention of adverse health impacts of PTS: regional specifics

Research results and already published data suggest that, notwithstanding some common cultural traditions and socio-economic problems of Indigenous residents of different regions of the Far North, there are some differences in levels of risks, associated with adverse health impacts of PTS (see Table 4).

Table 4. Assessment of PTS exposure routes and toxic human loads for Indigenous residents of different regions

PTS exposure routes	Murmansk Oblast, Lovozero district	NAD	TAD	CAD	
				Continental areas	Coastal areas
Ambient air	-	-	-	-	-
Drinking Water	+	+	+	-	-
Soil in human settlements	+	++	++	++	++
Occupational exposure	++	++	+	++	+
Indoor environment	+++	+++	+++	+++	+++
Traditional food (excluding secondary contamination)	+	+	++	++	+++

(-) – human intake of any PTS under 0.5%.
 (+) – human intake of any PTS from 0.5% to 5%;
 (++) – from 6% to 20%;
 (+++) – over 20%.

NAD – Nenetskiy Nenetskiy Autonomous District
 NAD - Taymyrskiy Autonomous District
 CAD - Chukotskiy Autonomous District

11. Recommendations on consumption of main types of traditional food products, accounting for ethnic and cultural specifics of different indigenous peoples of the North

For Indigenous residents of coastal areas of Chukotskiy Autonomous District:

Walrus, wheal, reindeer and hare meat, walrus fat, sea fish, wild birds of the tundra, wild edible plants, berries, fungi, roots, algae may be consumed without limitations. These food products are safe for all residents of coastal areas of Chukotka, including pregnant women and children.

It is necessary to limit consumption of salmon and waterfowl (not more than 400 g/day). Consumption of reindeer, fish and bird liver, and waterfowl fat should not exceed 100 g/day. Pregnant women and women who plan pregnancies, as well as children, should avoid consumption of phocae and *lakhtak* (particularly fat, liver and kidneys). Consumption of walrus, whale and reindeer liver and kidneys should be avoided. Need a statement here or above under the title acknowledging the cultural importance of Native food and that Indigenous Peoples should not have to alter their ways because countries use POPs.

For Indigenous residents of Murmansk Oblast, Nenetskiy and Taymyrskiy autonomous districts and in continental areas of Chukotskiy AD:

Reindeer and hare meat, freshwater fish, wild birds of the tundra, wild edible plants, berries, fungi, roots may be consumed without limitations. Consumption of salmon and waterfowl (ducks and geese) should be limited (not more than 400 g/day). Consumption of reindeer, fish and bird

liver should be strictly limited (not more than 100 g/day). Consumption of reindeer kidneys should be avoided.

Boiling of traditional food products in 4-fold volume of water with addition of salt (not less than 5 g/L) is the most simple and efficient method to reduce levels of the majority of PTS in food. During boiling in large volume of water fat will partly run into broth taking chlorine organic substances with it. Salted water “pulls out” metals. The meat of sea animals should be boiled in small pieces (less than 250 g) for at least 2 hours, on a small fire. Pot liquor should not be used.

It is recommended to boil fish with high fat contents in order to reduce PTS levels, alternatively, such fish should be fried with added oil under a closed lid. Remaining frying oil and fat should be removed.

Meat of game animals and birds killed by lead shot represent a major source of lead exposure of Indigenous Peoples. If not removed prior to cooking, lead pellets in meat may result in substantial human intake of lead (particularly if acidic berries or vinegar are added to food in the course of cooking).

Replacement of lead shots by steel ones may be a radical solution to address the above problem (specifications TU 7188-368-07625329-98 / Hunting steel shots).

In all other cases, it is recommended to remove lead pellets carefully in the process of cooking of game animals/birds. Besides that, it is recommended to apply cooking methods that exclude consumption of pot liquor and use of acidic food additives (e.g. blueberries, cranberries, vinegar, etc.).

Efficiency of practical application of the method

Implementation of programs that incorporated the above recommendations in several settlements with predominantly Indigenous populations in Chukotskiy and Nenetskiy autonomous districts resulted in substantially reduced environmental contamination by persistent toxic substances. Three years after the initial survey, in the course of the secondary survey of Indigenous residents, statistically significant reduction of blood levels of PCBs and DDT was observed in 82% of cases, (by 1.3-fold on the average). These survey data suggest reduction of adverse health impacts of these organochlorine substances.