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NATIONAL IMPLEMENTATION PLAN OF THE REPUBLIC OF KAZAKHSTAN ON THE OBLIGATIONS UNDER THE STOCKHOLM CONVENTION ON PERSISTENT ORGANIC POLLUTANTS

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Summary

The National Implementation Plan (NIP) of the Republic of Kazakhstan on the obligations under the Stockholm Convention on POPs presents the solution of this problem until the year 2028. By signing and ratifying the Stockholm Convention on POPs on May 23, 2001, the Republic of Kazakhstan announced its intention to follow the course of the world community toward the global approach to the elimination of chemicals hazardous for human health and the environment. The NIP was developed according to the Law of the Republic of Kazakhstan on the ratification of the Stockholm Convention on POPs, dated 7 June 2007 # 259, the "National Environmental Action Plan for 2008-2010" and the "Conception on the Ecological Safety of the Republic of Kazakhstan for 2004-2015".

The NIP is based on the results of an inventory on chemicals with POPs characteristics, which was carried out in 2003-2005 and covered the following:

- *storages of obsolete and unwanted pesticides;*
- *PCB-containing equipment;*
- *releases of dioxins and furans;*
- *POPs-polluted territories;*

1. Introduction

Persistent organic pollutants are a group of chemicals that possess toxic properties, resist degradation and are bioacumulated. These chemical compounds and mixtures are transported through air, water and migratory species across international boundaries and deposited far from their place of release, where they accumulate in terrestrial and aquatic ecosystems. Even small doses of POPs can harm normal biological functions, pass on to next generations and threaten human health and the environment.

Stockholm Convention on POPs. In Sweden, on May 22, 2001, more than 100 governments passed an international treaty, the objective of which was to reduce and in the end eliminate production, use, releases and storage of POPs. The initial target list consists of the 12 most hazardous pollutants - a "black dozen": aldrin, dieldrin, endrin, mirex, chlordane, heptachlor, hexachlorobenzene, DDT, toxaphene, polychlorinated biphenols or PCBs, dioxins and furans.

The "black dozen" chemicals are divided into three POPs categories:

1. Some pesticides which were earlier used to combat weeds, insect pests and for disease vector control - aldrin, dieldrin, endrin, mirex, chlordane, heptachlor, DDT, toxaphene, hexachlorobenzene.

2. Substances used in the industry as thermal liquid, in electrical transformers and capacitors, and as paint agents - polychlorinated biphenols and hexachlorobenzene.

3. Unintentional emissions of dioxins and furans in the metallurgical, cement, pulp and paper and chemical industries, in paints and colors production, during combustion of household waste and fires. Dioxins and furans may also be found in vehicle emissions, tobacco, wood and coal smoke.

The international treaty that addressed the most hazardous chemicals was called the "Stockholm Convention on Persistent Organic Pollutants".

In May 2009 at the 4th Conference of the Parties nine more chemicals were included in the list under the Stockholm Convention: chlordecone, hexabromobiphenyl, alpha hexachlorocyclohexane, beta hexachlorocyclohexane, hexabromodiphenyl ether and heptabromodiphenyl ether, lindane, perfluorooctane sulfonic acid (PFOS), its salts and perfluorooctane sulfonyl fluoride (PFOS-F) - in Annex A; pentachlorobenzene - in Annex C. The activities on their elimination will be included in the NIP after their inventory.

Objectives of the Stockholm Convention on POPs. Taking into account the pertinent provisions in Paragraph 15 of the Rio Declaration on Environment and Development, the objective of this Convention is to

protect human health and the environment from persistent organic pollutants.

The Stockholm Convention pursues five major goals:

Goal 1: Elimination of hazardous POPs, starting with the 12 most toxic chemicals.

Goal 2: Promotion of transition to safer alternatives.

Goal 3: Identification of additional POPs in order to take necessary measures.

Goal 4: Elimination of obsolete stockpiles and POPs-containing equipment.

Goal 5: Collaboration to achieve POPs-free future.

Assessment of the POPs problem in Kazakhstan. In Kazakhstan there is no production of POPs. The main sources of POPs pollution are obsolete and useless pesticides (including pesticides with POPs properties) in agriculture; POPs-containing equipment; use of industrial technologies resulting in unintentional release of dioxins and furans and formation of dioxins and furans in open combustion processes.

In the country's agriculture sector there is an urgent problem of obsolete and useless pesticides and the chemical identification of these. More than 1500 *tons* of such pesticides and mixtures of them are stored at warehouses and storages of the republic, part of them are stored in shabby housings with leaking roofs not constructed for these purposes and often these pesticides are piled in one heap. Approximately 10% of them are pesticides with POPs properties. The inventory of pesticides with POPs properties comprised only 20% of the country. POPs pesticides which were dumped earlier should also be extracted and disposed. Soils are in many places polluted with POPs-pesticide wastes. These areas are distributed sporadically. Decontamination of territories polluted with POPs pesticides is necessary.

Apart from the pesticides themselves it is necessary to solve the problem of utilization of their containers (more than 330 thousand units). The containers are of real threat for population health, as they are often used for economic purpose. Mostly they are used to store foodstuffs and water, by people not aware of the problem.

PCB was used in industrial production from 1968 till 1990 at the Ust-Kamenogorsk capacitor plant as liquid for filling capacitors. Equipment containing PCBs constitutes a problem. Currently on the territory of the Republic PCB-containing equipment is found in an amount of 116 transformers and about 50 thousand capacitors. The estimated amount of PCB contained in them is 980 *tons*. This equipment poses a potential threat for workers at the end of its lifetime, in case it is disassembled and the airtight containers are broken. The estimated total amount of wastes containing PCB is 250 thousand *t*. The Republic of Kazakhstan is the second state after the Russian Federation among Eastern and Central European countries when it comes to amount of POPs waste.

8 sites polluted with persistent organic pollutants have been identified in Kazakhstan.

Obligations assumed by Kazakhstan as a Party of the Stockholm Convention on POPs. As a Party of the Convention, the Republic of Kazakhstan shall:

- develop and realize a plan on implementaton of its obligations under this Convention;
- submit its implementation plan to the Conference of the Parties within two years of the date on which this Convention enters into force for it;
- establish structures for capacity-building relating to the implementation of the obligations under the Stockholm Convention on POPs and technology transfer;
- take measures to reduce the total releases derived from anthropogenic sources of each of the chemicals listed in Annex C, with the goal of their continuing minimization and, where feasible, ultimate elimination;
- undertake measures to reduce or eliminate releases from POPs stockpiles and wastes;
- facilitate or carry out exchange of information on POPs and designate a national focal point for the exchange of such information;
- promote provision to the public of all available information on POPs, conduct awareness and educational campaigns for all concerned parties;
- paying regard to available resources; encourage research and development, monitoring and cooperation on all aspects of POPs and their alternatives;
- with regard to POPs and, when necessary, their alternatives and potential POPs.

Key measures undertaken within the NIP. Provisions of the Convention envisage:

- measures on [elimination] control:
  - of intentionally produced POPs,
  - of unintentionally produced POPs,
  - of stockpiles and wastes,
  - of POPs-polluted territories.
- listing of new chemicals in the Convention;
- financial and technical assistance;
- implementation aspects.

National priorities. In relation to intentionally produced POPs, the Convention stipulates to stop production and use of them. Chemical substances which have to be disposed are listed in Annex A:

- aldrin, chlordane, dieldrin, endrin, heptachlor, hexachlorobenzene, toxaphene, mirex, polychlorinated biphenyls (PCB), toxafen, mirex.

DDT (produced and used in a number of countries in programs on elimination of carriers of hazardous diseases) is included in the Convention as a chemical substance of limited use (Annex P'). In Kazakhstan this issue is not a problem. Malaria is not of epidemic character. For the last years no more than 10 cases have been reported. Due to this the Ministry of Healthcare of RK does not consider it necessary to request the Secretariat of the Stockholm Convention about inclusion Kazakhstan into a number of countries-exceptions concerning DDT.

Strategic directions of the NIP on the obligations under ***POPs-containing pesticides***. There is no sense to separate POPs-containing pesticides from obsolete and useless pesticides since the last ones also pose a threat to the population health and the environment.The strategic directions of activity in this sphere are:

- Detailed inventory including the dumps and outdated places for storage of pesticides not yet investigated, identification and investigation of pesticides in other possible locations (the former airdromes of agricultural aviation, storages of veterinary preparations, storages of medical materials, medicines, etc.). For this purpose it is necessary to unite the efforts of all concerned ministries and units and to create an integrated database on identified stocks of pesticides using GIS technologies.
- Organization of monitoring of POPs-pesticides within the framework of USMSE RK.
- Inventory of dump sites, identification of the amount of stored pesticides and placing them in other containers and storing them in an environmentally safe way in special storages until they may be disposed of.
- Adoption measures on development and introduction of environmentally safe technology of disposal of identified POPs stocks. For this purpose it is necessary to provide assessment of available technologies on disposal of hazardous wastes (high temperature combustion methods, incineration in cement kilns, parallel combustion for the purpose of electrical energy generation and moving them to other countries, etc.)

Strategic directions of the NIP on the obligations under the Convention in the sphere of ***polychlorinated biphenyls (PCBs)****:*

According to the Convention, use of PCBs in appropriately operated equipment is allowed until 2025. After PCBs elimination in the equipment, PCBs must not be reused, unless the equipment is properly operated and maintained (Annex A, Part II).

In relation to PCBs three primary goals have been identified under the Convention:

- immediate phaseout of new PCBs,
- termination of operation of PCB containing equipment by 2025,
- early, and no later than 2028, introduction of environmentally sound elimination of PCB waste.

In the sphere of polychlorinated biphenyls Kazakhstan has the following priorities:

- Obtaining a more detailed PCB inventory (equipment and contaminated areas) at the oblast level.
- Development of a detailed plan of decommissioning of PCB -containing equipment at state and provate sector enterprises, indicating stages and terms of decommissioning.
- Defining the ways of disposing of PCB-containing equipment, wastes and contaminated soil.

- Defining areas of collection and temporary storage for decommissioned and disassembled equipment ready for disposal.

Strategic directions of the NIP on obligations under the Convention in the sphere of ***unintentionally produced POPs.*** The Convention has a goal of constant minimization, and where it is possible, complete elimination of all chemical substance releases listed in Annex C and produced from anthropogenic sources (dioxins, furans, PCB, hexachlorobenzene). A practical measure related to unintentionally produced POPs is the use of best available technologies and best environmental practices.

Strategic directions of the NIP on obligations under the Convention concerning POPs in stockpiles and wastes. The goal of the Convention is environmentally safe management of stockpiles, wastes, waste products and waste articles, consisting of, containing or being contaminated with POPs. In accordance with this, Kazakhstan needs:

- to develop and realize appropriate strategies for identifying stockpiles and wastes;
- to manage POPs stockpiles and waste in a safe, efficient and environmentally sound manner;
- to take appropriate measures so that POPs waste is:
    - handled, collected, transported and stored in an environmentally sound manner;
    - disposed of in such a way that the POPs content is destroyed or otherwise disposed of in an environmentally sound manner as regulated by international laws;
    - not permitted to be recovered, recycled, reclamated, directly reused or alternatively used;
    - not transported across international boundaries without taking into account relevant international rules (Basel Convention);
- to develop appropriate strategies for identifying sites contaminated by POPs.

Obligations of the Republic of Kazakhstan on the introduction of the NIP:

- establishment of a Commission (Committee) on persistent organic pollutants under the Council for Sustainable Development of the Republic of Kazakhstan or under the Ministry of Environmental Protection of the RK; as an interdepartmental coordination structure and National (subregional) center on persistent organic pollutants;
- review and update its National Implementation Plan on obligations under the Convention every five years;
- provide information on measures taken to fulfill obligations under the Convention and their effectiveness;
- when listing new POPs in the Convention, compliance with the agreed procedures (in Annex D of the Convention the following scientific screening criteria of new POPs are specified: persistence, bio-accumulation, potential for long-range environmental transport and adverse effects).

Inclusion of NIP into country priorities. In accordance with the "Concept on Environmental Safety of the Republic of Kazakhstan for 2004-2015" it is necessary to develop a Program on POPs Control, Monitoring and Management. The program is included into the budget program on "Environmental Protection of the Republic of Kazakhstan for 2008-2010". The POPs issue is reflected in the "Environmental Code of the Republic of Kazakhstan.

Assessment of the POPs problem in the country

There is no POPs production in Kazakhstan. The main sources of the POPs pollution are obsolete and unwanted agricultural pesticides (including pesticides that comprise POPs characteristics); equipment containing POPs; use of industrial technologies that lead to unintentional dioxin and furan releases; formation of dioxins and furans during open combustion.

The agriculture of the country faces an urgent problem of obsolete and unwanted pesticides and their chemical identification. More than 1,500 *t* of such pesticides and their mixtures are stored across the country, some of which are stored in piles in unsuitable worn out facilities, some with leaking roofs. Approximately 10 percent of these are pesticides with POPs characteristics. The inventory of pesticides with POPs

characteristics covers only 20% of the country. Pesticides buried earlier are also planned to be extracted and eliminated. Pollution of soil by pesticide waste with POPs characteristics is irregular and decontamination of territories polluted by POPs is needed.

In addition, there is a problem with the recycling of pesticide containers (more than 330 thous. units). Containers pose a threat to health of the population because they are often ignorantly used by people for household purposes (e.g., to store foodstuffs and water).

From 1968 to 1990 PCBs were used in Ust-Kamenogorsk capacitor plant in industrial production, as liquid to fill capacitors. Equipment containing PCBs constitutes a problem. Currently, on the territory of the republic, the following equipment containing PCBs has been identified: 116 transformers and about 50 thousand capacitors. The volume of PCBs content in them is roughly estimated at 980 *t.* The equipment poses a great danger to the workers towards the end of its operating life, when leakage may occur. The total volume of waste containing PCBs is estimated at 250 thous. *t.* The Republic of Kazakhstan occupies the second place among Eastern and Central European countries (with Russia in first place) when it comes to stockpiles of POP waste.

In Kazakhstan 8 areas polluted by persistent organic pollutants have been identified.

In the nearest future, Kazakhstan shall solve priority problems connected with POPs, including:

- establishment of a POPs inventory;
- development of a unified system for POPs management;
- adoption of special legislation on chemical safety and development of mechanisms for its realization;
- training of human resources in the sphere of POPs.

Realization of these tasks should be accompanied by the following activities: facilitation of awareness of the members of the Parliament and governmental bodies; training of human resources in the sphere of chemical safety; active participation of enterprises and the public; information and education for various population groups, especially in rural areas.

At the first stage of the NIP realization *(2010-2013)*:

- development of the normative legal basis in the sphere of POPs management;
- detailed inventory of POPs wastes and detailed evaluation of their unintentional release;
- identification of territories where POPs elimination is needed;
- development and realization of pilot projects on the rehabilitation of POPs polluted areas;
- proposals to the Secretariat of the Stockholm Convention on the listing of new POPs of global significance that are spread in Kazakhstan;
- raising of public awareness on the POPs situation in Kazakhstan.

At the second stage of the NIP realization *(2014-2017):*

- ultimate elimination of pesticides waste, except for buried waste;
- introduction of the best available purification techniques that reduce releases of dioxins and furans;
- development of a POPs monitoring system within USMS EP of RK.

At the third stage of the NIP realization *(2018-2028)*:

- elimination of POPs burial grounds and recently revealed storages of obsolete and unwanted pesticides;
- ultimate elimination of industrial POPs;
- active POPs monitoring.

The amount of financing of the activities under the National Implementation Plan on the Stockholm Convention will be defined in accordance with the Budget Code of the Republic of Kazakhstan.

2. General overview

2.1. General country profile

The Republic of Kazakhstan is a Central Asian country situated nearly in the center of the Eurasian continent between *40°56′ and 55°26′ N* and *45°27′ and 87°18′ E,* occupying an area of 2, 724.9 thousand km^2 (the ninth largest country in the world). Administratively the country is divided into 14 regions including 2 cities of republican importance, 160 districts, 10 districts of cities of republican importance, 39 and 45 cities of regional and district importance, 5 districts in the cities of regional importance, 2508 village and rural administrations, 35 villages and 7105 aul/rural populated areas. The capital is Astana (1994).

The population of Kazakhstan is 15.8 mln (as of 1 January 2009). The following population groups are especially vulnerable to POPs: children younger than 14 years old (representing 32.1% of the total population) and elderly people (representing 1.3% of the total population).

Transparency of the borders can facilitate the illegal import of POPs into Kazakhstan. Taking into account the transparency of the borders with Russia, Uzbekistan and Kyrgyzstan, it may be presumed that in addition to the registered companies, there are organizations illegally importing pesticides, including POPs, into the republic.

A huge latitudinal extent of the country (more than 3,000 *km* from north to south), with four geographic zones - deserts, semi-deserts, steppes and partially wooded steppes) theoretically welcomes a "grasshopper effect".

The climate is continental and dry. Most part of the country is inland which limits long-range environmental transport of POPs by water, but at the same time, encourages their concentration in the isolated inland areas.

Kazakhstan is mainly a country of plains, open from the north and west to air intrusion. Because of the domination of air-masses from the west, transboundary flows with POPs from industrial countries of Central and Eastern Europe can easily enter the northern regions of Kazakhstan (pic. 3, 4). From the east and south-east, Kazakhstan is protected by the mountains from outside intrusions.

Kazakhstan is an agrarian and industrial country. The GDP structure is dominated by industrial production. For the last ten years, the industrial development of Kazakhstan has been characterized by a stable and positive economy. The most capital intensive sectors are crude oil and gas production, metallurgical industry, production and distribution of electric power, gas and water.

2.2. Organizational, political and regulatory guidelines

The guidelines of the state environmental policy, including chemical safety, were included into the Conception on Environmental Safety, approved by the decree of the President of the Republic of Kazakhstan on April 30, 1996.

Since the moment the Conception of the Republic of Kazakhstan was adopted, great changes in public development have taken place. Strategic documents on state development were adopted (the Conception of the Republic of Kazakhstan on Transition to Sustainable Development for 2007-2024, 2006) and the basis of environmental legislation (the Ecological Code of the Republic of Kazakhstan, January 9, 2007 # 212) was created. International environmental conventions on chemicals – the Stockholm Convention on POPs (2007), the Basel Convention on control and transboundary transport of hazardous wastes and their disposal (2003), the Rotterdam Convention on the procedure of the prior agreed consent on certain chemicals and pesticides in the international trade (2007) were ratified. In addition, a system of environmental activity management has been created (Laws "On Licensing", 1995; "On Sanitary-epidemic Safety of the Population", 2002; "On Plant Protection", 2003; "On Food-stuffs Quality and Safety", 2004, "On Mineral Resources and Subsoil Use ", " Land, Forest and Water Codes of the Republic of Kazakhstan").

There is no specific POPs legislation in Kazakhstan. Therefore, the obligations of the relevant ministries, governmental agencies and bodies are based on special legal acts that provide instructions on certain chemicals (such as pesticides, transportation of hazardous goods, narcotic and psychotropic substances, medical drugs, etc). In many cases, the functions, responsibilities and competence of various ministries and departments are duplicated and there is little coordination of their activities. Different responsibilities on certain chemicals may disunite departments' activities because each department takes care of only those chemicals that are under their jurisdiction.

Responsibilities of the ministries and departments depend on their activities. Their functions and competence are directed to certain spheres (such as environment and health care).

In a longer perspective, a Protocol of functions distribution in the sphere of the chemicals management among participating ministries and departments within the framework of the basic Law on POPs **[Law on chemicals]** may be developed.

To increase the benefits and reduce the expenseses related to chemical POPs use, Kazakhstan makes efforts to control them through the development of corresponding strategies, adoption of laws, training of personnel and information dissemination. However, these efforts are not highly efficient due to lack of

political obligations, insufficient available resources, legislation gaps, lack of intersectoral cooperation, poor implementation of laws, insufficient training, etc.

2.3. Evaluation of the POPs problem in the country

2.3.1. Evaluation of the chemicals in accordance with Annex A Chapter I (pesticides containing POPs): production, use, import and export in the past, present and future. Current policy and regulating guidelines. Brief overview of the available data of the monitoring (environment, foodstuffs, human body) and impact on health

On the territory of Kazakhstan, there are over 25 mln *ha* of ploughed land and until the 1990s the use of pesticides covered practically the whole area. The total volume of annually used pesticides varied from 35 to 40 thous. *t.*

Due to a reduction of agricultural production in 1986-1995, the volume of chemicals use for plant protection was significantly reduced to 1.8 thou. *t.* The pesticide load per 1 *ha* of ploughed land was also reduced: from 0.57 *kg/ha* of the acting chemical in 1987 to 0.21 *kg/ha* in 1995 and 0.13 *kg/ha* - in 1997. Starting from 1998 the volume of pesticides use has increased. In recent years their amount varies between 9 and 11 thous.*t.* Although the selection changed, the number of chemicals permitted for use still remains at the same level (about 200 titles). The majority of the used pesticides are herbicides and insecticides.

According to official data, only chemicals included in the "List of pesticides (toxic chemicals) permitted on the territory of the Republic of Kazakhstan for 2003-2012" and its annual additions are imported. At present, there are over 300 pesticides permitted for use in agriculture.

At present, the agricultural and some allied sectors of the economy have ecological, industrial and technological problems linked with the accumulation and storage of large volumes of prohibited, unwanted and undesignated obsolete pesticides. It is possible that among these there exist pesticides that belong to the POPs group and that should be controlled in compliance with the Stockholm Convention on POPs.

Pesticides with POPs characteristics have never been produced in Kazakhstan, they are not imported or exported, and are not planned to be used in the future. The list of pesticides from the list of the Stockholm Convention on POPs includes all pesticides subjected to disposal and restriction, except for mirex, which has never been used in Kazakhstan. Due to the fact that pesticides with POPs characteristics were used in Kazakhstan for a long time, even now pesticides used in 1950s and 1960s may be found in the environment.

The main reasons for accumulation of obsolete pesticides are:

- inefficient planning of acquisition and distribution;
- inefficient system of acquisition/deliveries;
- prohibition of already acquired chemicals, due to a highter toxic or ecological threat;
- inappropriate chemical activity or chemical form;
- reduction of pesticide demand due to their insufficient effectiveness;
- long-term storage of pesticides with a short expiration date;
- unsatisfactory organization of storage and registering;
- low stability during storage and danger of fire;
- impractical size of the package and containers and poor quality of these;
- damage of package under the cause of time;
- evaporation.

Although DDT was officially prohibited in 1971 in the U.S.S.R., it was used in Kazakhstan in the fields of veterinary and medicine until the 1990s.

In the list of prohibited pesticides on the territory of the Republic of Kazakhstan, chlor-containing pesticides are discernible. Their list includes the following compounds: aldrin, dieldrin, DDT, heptachlor, hexachlorocyclohexane, polychloropinene, polychlorocamphene, etc. There are no approved sanitary and hygienic standards for some pesticides comprising POPs characteristics.

The situation analysis shows that in the republic the amount of the unwanted pesticides increases every year and the amount of disposed pesticides and their containers reduces. According to the data of the Ministry of Agriculture in the Republic of Kazakhstan, in 1998 there were 574 *t* of accumulated unwanted pesticides and 50 thous. containers. The inventory of obsolete pesticides that was carried out in 2001 prior to signing the Stockholm Convention by Kazakhstan revealed 621 *t* of unwanted pesticides on the territory of the country. Stockpiles of persistent organic pollutants in the Republic of Kazakhstan were estimated at 15.5 *t.* They were represented by toxaphene - 15 *t* (North-Kazakhstan Region) and *DDT* - 0.5 *t* (East-Kazakhstan Region).

According to the results of the inventory carried out within the NIP preparation (UNDP/GEF project) at the end of 2003, on the territory of the republic only 15 *t* of toxaphene were found in an identifiable form (in the region of North-Kazakhstan). But at the same time the total amount of obsolete and unwanted pesticides

increased up to 1,500 *t*, the majority of which are unidentified pesticides that require chemical identification, and over 330 thousand container *units.*

Monitoring of pesticides pollution sources, including pesticides with POPs characteristics, and studies of their impact on human health and the environment was not carried out in Kazakhstan.

A special concern is caused by pesticide waste in territories polluted by salts of heavy metals and/or radionuclides. Danger of the combined impact remains real despite the fact that the pesticides load has been significantly reduced in recent years.

Accumulation of significant amounts of prohibited and unwanted pesticides and their containers is a top-priority ecological problem that needs to be solved at the state level. The first step of solving this toxic and hygienic as well as ecological problem is a further inventory of the stockpiles of the obsolete pesticides. These may contain pesticides with POPs characteristics and their containers. The inventory of 2003-2005 carried out within the UNDP/GEF project covered only 20% of the territory.

Assortment, volumes and condition of obsolete pesticides, amount and volumes of containers, needed container replacement, etc, may only be estimated through a detailed inventory. Along with the inventory of obsolete pesticides it is necessary to identify the quantity of empty pesticide containers accumulated by consumers. These containers pose a serious threat for the population because they are often used for household needs such as to store foodsuffs and water. Therefore, it is necessary to take into account both quantity and types of empty containers (metal, plastic, cardboard, etc.).

2.3.2. Evaluation of chemicals in accordance with Annex A, Part II (PCBs)

In respect of PCBs, the Convention sets forth three major goals:

- immediate elimination of new PCBs production
- phasing out of PCBs-containing equipment by 2025
- early, no later than 2028, introduction of the environmentally sound PCBs wastes management.

PCBs stockpiles. There are no stockpiles of pure PCBs and PCB based oils (Sovol, Sovtol and others) on the territory of the republic. Leftovers of trichlordiphenyl in Ust-Kamenogorsk capacitor plant and production wastes were buried in the accumulation pond of the plant in 1990.

PCBs-containing equipment

Transformers. According to the preliminary results of the inventory in the republic there are 114 transformers filled with Sovtol produced by OJSC "Transformer" (town of Chirchik), four of which were produced in France. There are 105 transformers in OJSC "Mittal Steel Temirtau", six transformers in JSC "Atyrau oil refinery", two in OJSC "Ferrochrom" and one in the water treatment plant of Ust-Kamenogorsk.

Capacitors. According to the preliminary results of the inventory in the republic there are approximately 50 thous. capacitors, of which about 15 thous. are buried in the Semipalatinsk nuclear testing ground. Over 23 thous. capacitor units are in use and 78 capacitor installations with an unknown number of capacitor units in them are filled with trichlorodiphenyl. These were mainly produced in Ust-Kamenogorsk capacitor plant before 1990:

- 16,379 capacitors are installed in the Aksu ferro-alloy plant and 310 capacitors in the Aktyubinsk ferro-alloy plant and branches of JSC TNC "Kazchrom";
- 4 capacitor installations and 1,450 capacitors with trichlorodiphenyl are found in OJSC "KazZinc", of which 498 units have been decommissioned and prepared for disposal;
- 444 capacitors in the Ust-Kamenogorsk titanium magnesium plant;
- 811 capacitors with trichlorodiphenyl are decommissioned and stored in the storehouses of the power substations of OJSC "KEGOC" and only 9 units are in operation;
- 7 capacitor installations and 70 capacitors are installed in the enterprises of CJSC NAC "KazaAtomProm";
- 557 capacitors are in the possession of CJSC NC "Kazakhstan Temir Zholy";
- 1,024 capacitors and 105 transformers with PCBs are in use in OJSC "Mittal Steel Temirtau";
- 682 capacitors are held in CJSC NC "KazMunaiGas";
- 211 capacitors are installed in OJSC "AZKHS";
- 124 capacitors in "KazPhosphate, Ltd";
- 23 capacitors with unknown content in the state utility company "Oskemen Water Treatment Plant" of Ust-Kamenogorsk, 3 capacitors produced by UKCP are in OJSC "KazaMys" and 80 capacitors in "Altrade, Ltd" of East-Kazakhstan Region;
- several units of capacitors or 2-4 capacitor banks are in operation in several enterprises of Karaganda and West-Kazakhstan regions, respectively;
- in 2002, 14,865 capacitors with UKCP produced trichlorodiphenyl of UKCP were dismantled from

the electric power substation of Ecibastuz and subsequently buried in the Semipalatinsk nuclear test site;
- about 15,000 capacitors were found in former military base "Darial-U".

The following sectors possess equipment:
- energy sector - over 2,5 thous. pcs;
- mining and metallurgical sector - about 20 thous. pcs;
- railroad transport - about 600 pcs;
- chemical industry - about 400 pcs;

The administrative regions have:
- Pavlodar Region - 31,244 *pcs* of capacitors;
- East-Kazakhstan region - 1 transformer, 1,977 pcs of capacitors and 34 capacitor units;
- Karaganda region - 105 transformers, 1,262 pcs of capacitors and 6 capacitor units;
- Aktyubinsk region - 520 pcs of capacitors;
- West-Kazakshtan region - 351 pcs of capacitors and 2 capacitor units;
- Mangistau region- 323 pcs of capacitors;
- Zhambyl region- 290 pcs of capacitors;
- other regions - over than 2,000 pcs.

Other equipment. In the republic other kinds of oil filled equipment was used as well, such as oil-break switches, reactors, inputs, oil-flooded compressors and rectifying devices. According to the information of the Russian Federation in the Soviet Union PCBs were not used in the above mentioned kinds of equipment (also confirmed by selected oil tests of that equipment). PCBs can be found only in similar equipment imported into the country. It is necessary to examine these selectively for PCBs presence.

At the same time, Pavlodar chemical plant has produced soft cable and footwear materials based on polyvinyl chloride. The production was suspended starting from the 1990s. PCBs were used as a heat-transfer liquid in the reactor heating system to produce polyvinyl chloride footwear and soft cable compound. The amount of used PCBs was about 6 m^3. Today existing stockpiles do not exceed 1.0-1.5 m^3. At present, there are no experts left who operated this production and it is not known where the missing PCBs are located. Since polyvinyl chloride in Kazakhstan is not produced and raw material for this production needs to be imported, the operation of the plant is unprofitable and economically impractical. The left-overs of PCBs and polluted equipment should be utilized.

Wastes containing PCBs. Decommissioned and dismantled equipment with PCBs and the layer of soil with PCBs spillage from damaged equipment are deemed to be wastes containing PCBs. Such soils should be removed and put into air-proof containers or bags.

At present, decommissioned and dismantled capacitors with PCBs are located in OJSC "KEGOC", OJSC "KazZinc" and other enterprises. 14,865 capacitors and 50 bags with soil from the electric power substation of Ecibastuz buried in the Semipalatinsk nuclear testing site are considered to be wastes containing PCBs.

Another substation - "Central" - of the Sarbaiski branch of OJSC "KEGOC" (Kostanai) also dismantled 480 capacitors and stores them in the open air near the fence on the substation territory. On many capacitors leak traces can be noticed (they are covered with a layer of PCB-absorbed dirt) and near the storage of the capacitors there is a strong and persistent odor. The soil under the capacitors is saturated with PCBs. In 2005, the capacitors and the soil underneath them were put into metal containers, sealed and taken to a temporary storage to the Rudnensk electric power substation "Sokol", which is situated in 10 km from the steppe village of Rudny, and in 2008 they were taken to the Daryal former military base and prepared for transportation to Germany for elimination.

Other substations also have decommissioned capacitors. In Nikolsk substation (in the town of Satpayev) 480 capacitors were decommissioned but not dismantled. At the Balkhash substation 600 new capacitors are stored on the territory. There are 70 capacitors assembled but not operated in the Balkhash substation "KEGOC". 426 decommissioned capacitors are located in OJSC "KazZinc".

2.3.3. Evaluation for chemicals in accordance with Annex B (DDT)

Chemicals of restricted use are listed in Annex B. They include DDT.

With regard to DDT the Convention stipulates:
- elimination of production and use, except for cases of use for disease vector control,
- facilitation of scientific studies and development of safe chemical alternatives to DDT.

In Kazakhstan DDT was not produced. In the U.S.S.R. use of DDT was officially prohibited in 1971. However, until the 1990s DDT was used in Kazakhstan for veterinary and medical purposes (See *Annex A6*). Small left-over amounts of DDT can still be found in the soil, plants and water, air of the work zones and foodstuffs.

2.3.4. Evaluation of releases of unintentionally produced chemicals included into Annex C

(dioxins and furans, hexachlorbenzene and PCBs)

2.3.4.1. Sources of releases of dioxins and furans, PCBs and hexachlorbenzene. Dibenzo-p-dioxins and dibenzofurans, hexachlorbenzene and PCBs are unintentionally formed and released from thermal processes involving organic matter and chlorine as a result of incomplete combustion or chemical reactions.

2.3.4.2. *Potential industrial sources of releases of unintentional POPs in Kazakhstan.* Enterprises of practically all industrial sectors can be industrial sources of releases of unintentional POPs in the republic. The main sources are the energy, ferrous and nonferrous metallurgy, chemical, petrochemical, pulp and paper and cement industries.

Energy

The energy sector of the republic is represented by enterprises that extract fuel (gas, oil, coal) and produce electric power and heat (TTP, GRES, gas-turbine stations).

During oil and gas extraction, a part of the extracted fuel is burned in torches under high temperatures. Along with it, light fraction of hydrocarbons (methane, ethane) are burned without the formation of dioxins and furans. However, in the oil and gas deposits a significant amount of residual oil wastes are formed. They can at random or involuntarily get inflamed. Combustion of such wastes is a source of releases of dioxins and furans.

54 stations operating on coal - potential sources of dioxins and furans belong to the energy-producing enterprises. The annual volume of burned coal in the stations is 31,598.1 thous. *t.*

Almost all stations provide purification of the released gases. However, technologies and equipment as well as level of purification and efficiency vary in different stations, depending on the period of their construction and operation. There are stations built in the 1940s-1980s. Many of them are obsolete: sometimes gas is purified by cyclones, sometimes through electrofilters, and sometimes with the help of gas scrubbers. To prevent releases of dioxins and furans it is necessary to replace the operating equipment with new technologies (fabric filters, etc.).

Ferrous and non-ferrous metallurgy

Agglomeration sintering. In Kazakhstan the ferrous metallurgy is represented by production enterprise SC "Atasuruda", SSGPO. Agglomeration sintering is a potential source of release of dioxins and furans in the ferrous metallurgy. The amount of the produced agglomerate in the republic is 6,005.4 thous.*t.*

Coke production. Another potential source of releases of dioxins and furans in the ferrous metallurgy is coke production. Coke in the republic is produced only by one enterprise; OJSC "Mittal Steel Temirtau", which produces coke from pit coal through heating without air access. Releases of dioxins and furans are possible only at the stages of unloading and extinction of coke. Unfortunately, these processes are carried out in the open air without special devices to entrap and purify the released gases. The annual volume of coke production is 2,624.7 thous. *t.*

Foundry production. In Kazakhstan pig iron and steel are produced in one enterprise - OJSC "Mittal Steel Temirtau". Foundry production exists in many enterprises of the mining, metallurgical and engineering sector. The 2002 annual volume of production was: pig iron - 4,008.8 thous. *t*, steel - 6,040.3 thous. *t.*

Copper production. In the copper melting plants of OJSC "Corporation "KazakhMyz" (Balkhash, Zhezkazgan and village Glubokoye in East-Kazakhstan Region) purification of the released gases is provided with the purpose of getting sulphuric acid, and the dust entrapped from the gas, that might contain dioxins and furans, is sent for further processing to extract such valuable components as rhenium, osmium, selenium, etc.

Remelt copper production using copper scraps may form dioxins and furan in significant amounts since copper is a catalyst of their formation. According to the data of the Ministry of Industry and Trade of the RK, there are no enterprises producing remelted copper in the country.

Many machine-building enterprises are engaged in the foundry production of copper and its alloys, brass in particular.

Aluminium production. There is no production of primary and secondary aluminium in the republic but several enterprises produce cast aluminium.

Lead production. During the production of primary lead, releases of dioxins and furans are very small and are not listed in the register. The Ust-Kamenogorsk lead and zinc combine - OJSC "KazZinc" and Shymkent lead plants are the only enterprises in the republic that produce primary lead.

Secondary lead smelting from lead scraps of chiefly lead fins for automobile accumulators is accompanied by formation of a significant amount of POPs when polyvinyl chloride parts of the accumulator get into smelting kilns. OJSC "Kainar" produces automobile accumulators and therefore smelts secondary lead. It is possible that secondary lead is smelted in small amounts by small enterprises (automobile bases, Ltd), but the information on these is not available.

Zinc production. Production of zinc from the dust and slags of other productions is carried out under high temperatures 1100-1200 °C under which formation of dioxins and furans is unlikely. Primary zinc is produced by several enterprises: OJSC "KazZinc", "NovoZinc" Ltd, and OJSC "Corporation "KazakhMys".

Smelting of secondary zinc out of scraps is carried out under 350-450 °C. Smelting of secondary zinc is possible carried out in small enterprises but there is no information on them.

Brass and bronze production. Production of alloys based on copper under relatively low temperatures (up to 1000 °C) may also be accompinied by formation of dioxines and furans. ZOZM Ltd in Balkhash produces primary copper alloys. In addition, many machine-building enterprises cast brass and bronze in the small kilns that can be sources of dioxins and furans.

Magnesium production. Magnesium usually is produced through fused electrolysis of magnesium chloride which is produced by chlorine treatment of magnesium oxide under 700-800 °C together with coke. Electrolysis is carried out by graphite electrodes which may also be a source of dioxins and furans. In Kazakhstan magnesium is produced by the Titane and Magnesium Plant in Ust-Kamenogorsk.

Production of construction materials

Lime production. Formation of dioxins and furans is possible during limestone burning in shaft kilns. In the republic lime is produced in Temirtau Chemical and Metallurgical Plant, Ltd in a shaft kiln.

Brick production. Various types of clay and fuel are used during brick burning. Burning of raw brick is carried out in ring or tunnel kilns, where there is no contact between the burning gas and brick. Fuel is burned separately and releases of dioxins and furans depend on the completeness of gas combustion and the quality of purification of released gases. In some cases, gas purification is minimal or there is none at all. In soviet times, almost every town had their own brick plants, but the majority of them were liquidated during the economic crisis. At present, some of them are tried to be launched back to the operation but their functioning is unstable.

Asphalt-concrete production

Preparation of asphalt can be a source of dioxins and furans. Small plants producing asphalt exist in many regional centers.

Textile production

According to the information received from the akimates, chloranil and pentachlorophenol - sources of dioxins and furans -

are not used in the enterprises of light industry of Kazakhstan.

Residential heating and cooking

At present, accurate information on quantity of the households and volumes of burned fuel is not available.

Open waste incineration

In Kazakhstan all forms of open incineration are used. Use of the best techniques and ecological practice in these issues is the key to the solution of social problems of local communities as well as their democratization.

Solid domestic wastes

In Kazakhstan there are no operating waste processing plants. Solid domestic wastes are stored in the open grounds near settlements. There is no data on the volume of stored wastes in the urban and industrial dumps. Spontaneous combustion takes place in many of them. There is no data on fires on the domestic waste dumps.

Hazardous wastes

In Kazakhstan hazardous wastes of the industrial enterprises are stored in the special industrial grounds. Specific requirements of their burial are applied in accordance with GOST and controlled by oblast sanitary and epidemiological stations and territorial departments of the environment sector. Incineration of hazardous wastes is not carried out due to the lack of appropriate techniques and high cost of incineration. There is spontaneous combustion on the dumps.

Medical wastes

Medical wastes are formed practically in all treatment-and-prophylactic facilities of the republic.

Utilization of medical wastes is carried out by various ways from autoclaving to burning in small furnaces, the significant part is simply taken out to municipal waste sites or dumps

Incineration of wood and biomass wastes. During the soviet regime, almost every region in Kazakhstan had wood-processing enterprises. Many of them have been liquidated by now. The remaining enterprises operate very unsteadily and there is no data on their wastes.

Incineration of sewage sludges is not carried out in Kazakhstan.

Biomass combustion

There are cases of biomass combustion.

Incineration of wastes and spontaneous fires

The Ministry of Emergency Situations of RK has information on the quantity of fires in Kazakhstan but there is no data on volumes of materials burned.

Biomass drying. At present there is no data on this category.

Crematoria. There are small animal carcasses crematoria in the country but there is no accurate data on their quantity and location.

Smokehouses. The majority of meat-processing plants that operated in the republic during the soviet era are eliminated. Nowadays small enterprises operate on their premises. Available information does not unfortunately cover all these enterprises.

Left-overs of dry cleaning. At present, many small enterprises providing dry cleaning services operate in the republic, but there is no information on the quantity, location and amount of used degreasing solvents and their wastes.

Tobacco smoking. In the republic there are 2 branches of renowned cigarette producers: Philip Morris (Almaty) and Galaher Kazakhstan (Symkent). In addition, a large amount of cigarettes is imported to the country.

Wastewater/sewage treatment. Wastewater of many enterprises in the republic undergoes special treatment and is later dumped into specially dedicated accumulation ponds. Nevertheless, there are cases of dumping of untreated wastewater into city sewage systems or small open water basins. There is no data on dioxins and furans content in the sewage.

Dumping into open water basins.

Dumping of wastewater into open water basins is carried out upon appropriate treatment and in compliance with GOST and controlled by sanitary and epidemiological stations. There is no data on dioxins and furans content in the treated dumping water.

Composting.

At present there is practically no composting for the agricultural purposes. There are few cases of composting in dachas.

Oil waste treatment.

Processed oil officially is not treated and dumped into industrial waste grounds. There is no data on the volume of the used oil.

Calculating assessment of the releases of dioxins and furans

According to the technique developed by UNEP Chemicals, a preliminary level of releases of dioxins and furans in Kazakhstan for 2002 was estimated at 340 g-TE *per year* (*Table 1*).

Table 1

Release of dioxins and furans in selected sectors of economy

(calculated according to the technique of UNEP Chemicals "Methodological Guidance on identifying and quantitative assessment of the release of dioxins and furans", 2001)

Sector	Annual releases *(g-TE/year)*				
	Air	Water	Soil	Fly ash	Slag
Production of power and heat energy	315,981	0,000	0,000	0,000	0,0
Production of ferrous and nonferrous metals	3,324	0,000	0,000	0,000	9,1
Production of goods of mineral raw materials	17,819	0,000	0,000	0,000	2,1
Uncontrolled processes of incineration	2,829	0,000	0,051	0,000	2,7
Production and use of chemicals and consumer goods	0,000	0,000	0,000	2,845	0,0
Other	0,002	0,000	0,000	0,000	0,0
Total	**340,0**	**0,0**	**0,1**	**2,8**	**13,9**

The figure equal to 340 *g-TE/year* is clearly underrated because the data on incineration of the

medical wastes, fires in waste dumps, unsanctioned waste incineration in enterprises and households (i.e., on those categories that produce the most release of dioxins and furans) was not included into the calculations.

2.3.5. Data on awareness of stockpiles, polluted areas and wastes: identification, probable amounts, appropriate regulations, methodological guidance, measures on improvement of the situation and data on releases from the sites

Territories polluted with PCBs

There are 8 "hot spots" polluted with PCBs in Kazakhstan:

1. Territory of Ust-Kamenogorsk capacitor plant (UKCP). In UKCP capacitors were filled with trichlorodiphenyl until 1989. In 1989 a republican commission of the Ministry of Health of Kazakh S.S.R. was working in the plant. The Commission prohibited the use of trichlorodophenyl and developed an action plan on rehabilitation of the plant territory. Left-overs of trichlorodiphenyl (about 6-9 *t*) and contaminated soil was removed from the plant territory, taken to an accumulation pond and buried. The production technique was redirected to the saturating agent DOF, produced in Japan. Documentation on the decision of the commission and the implemented activities are not available in the enterprise. Although rehabilitation activities were carried out in 1990-1991, results from soil samples from the plant territory and closely located Ablaketka village show that the PCB content in the soil is still very high. On the territory of the plant the PCB content is 1,730 *mg/kg* and on Irtysh bank - 7-4 *mg/kg,* when mac is 0.06 *mg/kg.*

2. UKCP accumulation pond. The plant accumulation pond is located on the slope of the mountain in another end of Ust-Kamenogorsk and it is continuously filled by current wastes from the treatment facilities of the plant and the drainage pits. The pond is filled with melt waters (according to various data, the height of water is from 2 to 6 *m*). The pond is without a fence and proper security service. It is located higher than the city and there is a danger of PCBs entering Irtysh through underground waters. Around the pond there are shafts but there is no monitoring. Left-overs of trichlorodiphenyl were placed there (according to the words of the personnel of the plant, the volume was about 6-9 *t*) and a layer of soil was removed from the plant territory as part of plant rehabilitation activities. These were also dumped into the accumulation pond. Analysis of the soil layer from the beach and water of the pond showed that the PCBs concentration is 12,438 *mg/kg* and 0.19 *mg/kg*, respectively. Thus, the pond poses a threat to polluting the air with PCBs due to PCB evaporation during the warm season, and entry of PCBs into Irtysh with underground waters.

3. The territory of the power substation in Ecibastuz. Construction of the substation began under the soviet system with the purpose of transmitting the power energy produced in Ecibastuz TPP to the European regions of Soviet Union and countries of the Council for Mutual Economic Assistance. The task of the substation was to rectify alternating current into constant current. For these purposes one planned to use capacitor batteries. By the moment of the Soviet Union collapse, about 15 thousand capacitors were assembled in the open areas on both sides of the rectifying substation. During the economic crisis, the population broke and unsealed many capacitors in order to get nonferrous metals, i.e. copper bars. In 2001 an emergency commission was established in Ecibastuz to eliminate the ecological threat to the population and the environment due to trichlorodiphenyl evaporation (near the dacha area and Irtysh-Karaganda canal). During the liquidation works in 2002, a new owner of the substation dismantled and sealed capacitors with a sealing foam. Part of the soil contaminated by trichlorodiphenyl spillage was removed and packed into bags. Later, the capacitors and the bags with soil were taken to and buried in the Semipalatinsk nuclear testing site area. But the range of the carried out activities was not complete. The soil under the docks on which the capacitors were installed has not been removed. PCBs concentration under the dock poles reaches 26,200 *mg/kg*. It is therefore necessary to dismantle the docks, remove the soil layer and bury the soil on a temporary basis; either in the closed building or in the Semipalatinsk testing site area, till the decision on its utilization is taken.

4. Workshop for production of soft cable and footwear in the Pavlodar chemical plant.
5. Derzhavinski site for missile elimination.
6. Zhangiztobinski site for missile elimination.
7. Territories of the former military bases in the northern part of Trans-Balkhash area.
8. Territory of the power substation in Kostanai.

Due to the recent emergence of the issue, Kazakhstan does not have appropriate regulations, methodological guidelines, and measures on improvement the situation.

2.3.6. Current programs of monitoring of releases and impact on human health and the environment, including outcomes.

In Kazakhstan the issue of monitoring POPs releases is extremetly urgent. Scientific or applied

studies on unintentional POPs releases (dioxins and furans) have never been conducted. The data received within the framework of UNDP/GEF project "Initial Assistance to the Republic of Kazakshtan on Implementation of the Obligations under the Stockholm Convention on POPs" shall be the basis for monitoring, though measurements of their content in foodstuffs and biotic substrate have never been conducted.

With the financial assistance of the project, in 2005 the Bashkortastan Republican Scientific Ecological Center carried out the first analysis of tests on dioxin and furan content in Kazakhstan. Their toxic isomers were identified in 6 samples of the air selected mainly in working places of the metallurgical enterprises and in 7 samples of city soil and scrapes from the walls of workshops.

A. *Dioxins in the air of the working places.*

PCDD/PCDF content in the samples of air of the working places is high in the copper smelting workshop of the mining and metallurgical combine in town of Balkhash (over 4 *pg/m*^{3}), near the sintering machine in the plant "Mittal Steel Temirtau" (about 4 *pg/m*^{3}) and in the machine-building plant in Karaganda (about 2 *pg/m*^{3}), since the content is 8 and 4 times higher than the maximum allowable concentration in the air - 0.5 *pg/m*^{3}. Approaching the limit of allowable concentration are the working conditions in hydrometallurgical production JSC "KazZinc".

Low concentrations found in coke and chemical production of "Mittal Steel Temirtau" occur due to technological specifics of the production methods. These are mainly connected with high concentration of PCDD/PCDF -absorbing coal dust in the air. However, this does not exclude a long-term pollution of the territory near the coke kiln batteries, the level of which could be assessed through analysis of soil or dust.

Air of the sanitary zone of JSC UKTMC in Ust-Kamenogorsk fully meets the norms of other countries (USA -0.02, the Netherlands - 0.024, Italy - 0.04 pg/m^3) in respect of dioxin pollution.

B. Dioxins in the dust of industrial enterprises

The results received for the polluted air of the working zone of the metallurgical enterprises were confirmed by the analyses of dust from the workshops wall scrapes (*Table 7*). As shown in *Table 9,* the highest figures on the current air flow correlate with the data on long-term pollution (dust). Combined impact on workers of both aerosols and dust particles and emission of PCDD/PCDF, especially in summer, may cause accumulation in biotissues. Utilization of this dust during cleaning in the workshops requires the same type of management as with wastes of Danger Class 1 and observance of special measures on safety of the workers. It is obvious that the wastes of these enterprises may be a source of environmental and population contamination.

Table 2

PCDD/PCDF concentration in air samples, TEQ, pg/m^3 *and dust (wall scrapes), pg/g*

Place of taking samples	*Air, pg/m*^{3}		Dust, pg/g	
	Concentration	TEQ-WHO	Concentration	TEQ-WHO
Mining and metallurgical combine, a copper smelting workshop, Balkhash city	51.33	4.08	5377.06	263.78
Machine-building plant, Karaganda city	17.8	1.84	46.12	4.06
"Mittal Steel Temirtau " Plant, sinter machine # 5, Temirtau	42.64	3.77	5419.7	607.7
"KazZinc", hydrometallurgical production, Ust-Kamenogorsk city	6.33	0.47	289.35	19.83

High exposure of workshop workers to dioxins could be proved through analysis of dioxin concentration in their blood. These data can be a basis for measures to improve the labour conditions in the plants.

C. Dioxins in the city soil

It is know that the main way of PCDD/PCDF entry into soil are through pollutants in combustion releases of industrial, household waste and hospital furnaces. The major ways of destruction of PCDD/PCDF are photodegradation and evaporation. Vertical migration is not significant, especially in soil with a high content of organic carbon. According to different data, PCDD/PCDF degradation time in soil (semi-decomposition period) is 10-50 years in ground soil and 1-10 years in surface soil (up to 0.1 *cm*). PCDD/PCDF degradation depends on soil characteristics and climate conditions. It is proven that octa-chlorinated isomers are subjected to photodechlorination to a higher extent than low-chlorinated isomers. Presence of organic solvents increases PCDD/PCDF soil penetration due to easier transport.

It is acknowledged that soil cover pollution greatly varies and depends on the level of development pressure. Figures for environmental levels are the following: for Northern America - 7,96 B±5,7 *pg TEQ/g* (number of tests, n=95) and for Europe - 8,69B±4,7 *pg/g* (n=133) (USEPA, 1994). Usually, the isomers with high chlorine content dominate in the isomeric spectre. PCDD/PCDF concentration in the urban zone is higher than in rural areas. An approximate safe impact level (ASLI RF) of PCDD/PCDF content in the soil is 0.33 *pg/g*. Dioxin content norms in agricultural areas in European countries are significantly higher - 5 *pg/g* (Italy), 10 *pg/g* (Netherlands, Germany). It is known that a level of 9 *pg/g* is often registered on the territories of European industrial cities. However for Russia, as a rule, this is a very high level of pollution and an average level would be 1-3 *pg/g*.

Obtained figures for soil taken 1-3 km from the Balkhash idustrial zone show less than 1 *pg/g*. This shows the absence of active air pollution from the chimneys of TPP and the plant. At the same time, the figure of soil pollution within the city in the Central park, exceeds 6 *pg/g* and indicates the presence of local sources: leaf burning and contamination from residential chimneys and vehicles.

2.3.7. Modern level of information, awareness and education of the relevant groups. Current systems of information transfer to various groups. Mechanism of information exchange with other Parties to the Convention.

The POPs issue, especially from the industrial perspective, is relatively new for Kazakhstan. Representatives of the legal and executive bodies, industrial circles and people at large know little what POPs are, how they are formed and what danger they pose for human health. Thus, promotion of the public awareness on POPs issue and involvement of its most active groups in addressing the problem is extremely important. Promotion measures in this direction are stipulated by the NIP.

With the assistance of the international organizations and, first of all, UNEP Chemicals, UNIDO, UNDP, the international network on POPs, NGO "Ecoaccord", and others, the mechanism of information exchange with other Parties to the Convention is well developed and acting.

2.3.8. Appropriate activities of the non-governmental concerned parties

During the NIP development, the nongovenmental concerned parties carried out the following activities:

- public awareness raising through organizations and carrying out of informational activites and campaigns;
- establishment of resource centers provided with information on POPs, with open access to all concerned parties in the regions;
- lectures in educational institutions delivered by attracted experts;
- articles in specialized popular and scientific magazines;
- seminars for teachers of chemistry, biology, geography, valeology, and natural sciences;
- organization of an information campaign (distribution of booklets, flyers, science kits on POPs);
- movies, advertising videoclips, themes within ecological programs;
- newspaper articles of general character with specific examples of POPs location and ways of a solution to the problem;
- development of an educational module for teachers. Development and implementation of informational and educational programs at the national level.

2.3.9. Identification of affected communities or environments, evaluation of the scope and significance of the threat for human health and the environmental quality as well as the social consequences, to prevent the negative impact on workers and local communities.

Ecological and hygiene studies confirm the results of investigations on the negative impact of POPs on reproductive health. In agricultural areas the impact is connected with pesticides and in the industrial sector with the releases of dioxins and PCBs. Therefore, two objects were selected as models to evaluate the POPs threat for human health. They were Ablaketka village (a part of Ust-Kamenogorsk polluted with PCBs) and the town of Balkhash of Karaganda region, where the mining and metallurgical factory could be a source of pollution by dioxins and furans, according to the preliminary data of 2005.

Ablaketka village. PCBs pollution in this village is caused by the activity of Ust-Kamenogorsk capacitor plant (UKCP) situated on its territory. The enterprise used trichlorodiphenyl as an impregnated insulating liquid. According to archive data, if one considers industrial wastes on UKKZ only, around 188 to 227 *t* of polychlorinated biphenyls were released into the environment every year. 12-14 *t* per year (6-7%) were released through the ventilation systems, the rest of the amount, over 85% mass, were liquid and semiliquid wastes. As a result of the enterprise the operating the area of the plant and the nearest area was polluted by polychlorinated biphenyls.

In the 1990s the polluted soil was removed but there were left-overs left in the accumulation pond. The major ecological concern of the enterprise became the residual impurity of the adjacent plant territory, the tailings storage and its industrial site.

The situation of pollution in the 1980s. Analyses of the samples of atmospheric deposition (snow, water, bottom silts, aquatic vegetation, ground vegetation and fish from excurrent ponds) were carried out through the method of gas-liquid chromotography by experts of the Institute of applied geophysics named after Ye.K. Feodorov (1987). In addition, samples of breast milk was taken from 9 women who did not have contact with PCBs and from 3 women who did have contact, and tested. PCBs were identified in all analyzed samples. Their content in the wastewater of the capactitor plant was from 12 up to 46 *mkg/l.* The water in the channel at a distance of 100 *m* below the dumping site had a very high PCBs concentration - 1.770 *mkg/l.* A sudden fall of PCBs content was observed at a distance of 400 *m.* The water in the finishing ponds also had PCBs in it. Bottom silts and aquatic vegetation turned out to be powerful accumulators of such hydrophobic compounds as PCBs which meant a very high level of PCB was present in these. Indexes of accumulation were 10^3-10^4. As accumulators of persistent organic compounds, the bottom silts became a secondary source of long-term water pollution.

Current situation of pollution. Analysis of the samples carried out in 2003, showed content of PCBs in the soil outside the plant territory at the level of 35.73 *mkg/kg*, direct current of the basement of the accumulation and impregnating workshop - 98.31 *mkg/kg*; in treatment facilities, in sludge basins and in the soil of the places of unloading of PCBs containers - 1,296.2 and 1,729.4 *mkg/kg* respectively.

Balkhash city. The Balkhash mining and metallurgical combine is an example of a Kazakhstan city where the received preliminary data demonstrate significant emission of dioxins into the air of the working environment. 4 $pg/^3$ of dioxins is found in the air samples of the working environments, which is 8 times higher than mac.

Selection of indicators for study of POPs impact on human health. Persistent organic pollutants represent a serious threat for human health and the environment, causing birth defects, oncopathology, disfunction of the immune and reproductive systems, fertility problems, a higher liability to diseases and even imbecility. The most vulnerable are fetus and infants who are exposed to POPs impact through the placenta and during nursing.

Studies technique. Residents of the area near the silk fabric factory which is situated in Ust-Kamenogorsk but outside the polluted zone, across the Irtysh, were chosen for the study.

The birth rate in the studied settlements during a 5-year period was constantly lower than the country indicators. The lowest birth rate is in Ablaketka village. In 1999 this indicator was 4.3 which is 3.4 times lower than the Kazakhstan country average.

Birth defects. During 1999-2003, the frequency rate of infants born with birth pathology varied. Between 1999 and 2003, the rate of the infants with birth defects was 3.1 times higher in Ablaketka village than in the Republic of Kazakhstan and 1.5 times higher than in the control area of silk fabric factory of Ust-Kamenogorsk. During these 5 years, the birth rate of infants with birth defects was 2.7 times higher in Balkhash than in the Republic of Kazakhstan.

Being pseudohormons, persistent organic pollutants are able to destroy natural hormons in the organism. As a result, infants may have birth defects of the urinary system. This is due to the fact that normal formations of urethra and the lowering of testicles into the scrotum depend on androgenic processes, which may be interfered by persistent organic pollutants. A high incidence of pathology of sexual development as well as small development defects, such as cryptorchidism and hypospadias, is also found.

The studies of the structures of the birth pathology show that frequency of androgenic birth development defects (including cryptorchidism and hydrocele), in the area of the silk fabrics factory (6.9%) almost does not differ from the indicator in the Republic of Kazakhstan (6.5%). In Ablaketka village (14.8%) and in Balkhash (14.4%) the level of hormonal birth development defects is twice higher than the republican and control level.

Sex ratio. In recent years an infant sex ratio indicator is used as an indicator of the ecological problem. Increase of a girl rate can also be observed. Within these 5 years, the sex ratio in Kazakhstan is 1.06, i.e. per 100 girls 106 boys are born. In Ablaketka village this indicator in 2001 and 2003 was lower than the republican one, - 0.85 and 0.94 respectively, i.e. the girl ratio was higher.

Oncological disease. The International Agency on Cancer Studies included some of persistent organic pollutants into the list of oncogenic chemicals that encourage a cancer development in an individual. Today indicators of oncological disease (together with incubation period of tumor development) reflect the environmental pollution situation equal to the one of 2-3 decades ago.

Results of epidemiological studies among Ablaketka and Balkhash populations provide proof of the cancerogenicity and malignancy of persistent organic pollutants. The highest oncological disease rate in the period of 1999-2003 was observed in Balkhash. In Ablaketka the disease rate was lower than the republican indicator and 1.2 times higher than in the control area of the silk fabric factory.

Hormonal dependent malignancy. The analysis of intensity of malignant hormonal dependent

disease revealed that cancer localizations such as tumors of the female genital sphere, breast cancer, prostate cancer, urinary bladder cancer, and thyroid carcinoma are more frequent than in the Republic of Kazakhstan *(Table 3).*

Table 3

Hormonal types of cancer (per 100 thous. female and male population)

Intensive indicators

	Tumors of female genital sphere	Breast cancer	Prostate cancer	Urinary bladder cancer	Thyroid carcinoma
Republic of Kazakhstan	344.9	170.1	35.3	19.1	14.0
Combine of silk fabrics, Ust-Kamenogorsk	235.3	130.7	29.3	17.3	17.3
Ablaketka village	509.9	338.1	48.2	74.2	49.4
Balkhash	431.5	205.7	31.8	33.6	30.9

The Kazakhstan average amount of cases of tumors in the female genital areas was 344.9 (per 100 thous. female population). In Ablaketka this indicator was at the level of 355.0 which is 1.5 times higher than among the female population of the area of the silk fabrics factory (235.3 per 100 thous females). In the town of Balkhash the disease rate of tumors of the female genital area was 431.5 per 100 thous. of females, which 1.5 times higher than the republican indicator.

Breast cancer. Breast cancer in the Republic of Kazakhstan is at the level of 170.1 per 100 thous. women. Among women who live in Ablaketka, breast cancer is at the level of 185.9 per 100 thous. women. This is 1.4 times higher than the indicator of the silk fabrics factory control area (130.7 per 100 thous. women). In Balkhash the intensity of the breast cancer rate was 205.7 which 1.2 times higher than the republican indicator.

Prostate cancer. Prostate cancer in the Republic of Kazakhstan is at the level of 35.3 per 100 thous. of the male population. In the control area of the silk fabrics factory the level is 29.3. The prostate cancer rate in Ablaketka is 48.2 per 100 thous. males, which is 1.6 times higher than the level of the control area of the silk fabric factory. In Balkhash this pathology rate is at the level of 31.8 per 100 thous. males.

Urinary bladder cancer. Urinary bladder cancer in the Republic of Kazkhstan is observed at the rate of 19.1 per 100 thous. In the control area of the silk fabrics factory this rate is 17.3. This pathology rate was observed among the people of Ablaketka at the level of 57.7 per 100 thous. which is 3 times higher than the republican and control indicators. In Balkhash urinary bladder cancer rate is 33.6 per 100 thous. which is 1.7 times higher than the republican indicator.

Thyroid carcinoma. Thyroid carcinoma in the Republic of Kazakhstan is registered at the level of 14.0 per 100 thous. In the control area of the silk fabrics factory this indicator equals 17.3. The thyroid carcinoma frequency among the population of Ablaketka is 24.7 per 100 thous. which is 1.4 times higher than the control indicator and 1.7 times higher than the republican level. In Balkhash thyroid carcinoma is at the level of 30.9 per 100 thous. which is 2.2 times higher than in the Republic of Kazakhstan.

Frequency and structure of breast cancer tumors and cancer in the female genital area (hysterocarcinoma, cervical cancer and ovarian cancer) were separately analysed.

The level of the cervical cancer rate in Ablaketka is 84.5 per 100 thous. females which is 1.2 times higher than in the Republic of Kazakhstan (68.5 per 100 thous. females).

Ovarian cancer is diagnosed 2.6 more often among the women living in Ablaketka (50.7), whereas in the control area of the silk fabrics factory this indicator is 19.0. In Balkhash the ovarian cancer rate is 1.3 times higher compared to the Republic of Kazakhstan and equals 65.2 against the Republic of Kazakhstan average of 49.6 per 100 thous.

Thus, the conducted studies on the frequency of oncological pathology, analysis of tumors in the female genital area and hormonal dependent types of cancer (breast cancer, prostate cancer, urinary bladder cancer and thyroid carcinoma) do not exclude the impact of persistent organic pollutants on people who live in the studied areas.

3. Elements of the strategy and an Action Plan of the National Implementation Plan

3.1. Introduction strategy

The NIP is an operational document that gives a structure to the implementation of the Stockholm Convention in the Republic of Kazakhstan. The NIP is developed on the basis of a large-scale consultation

with partners and in close cooperation with national structures. Involvement of all concerned parties into the NIP implementation is a necessary condition to achieve the goals. A distinct distribution of the responsibilities and tasks is the key element of the NIP realization that requires close intersectoral cooperation and appropriate activity coordination.

The Ministry of Environment of the Republic of Kazakhstan is responsibility for coordination. To ensure effective coordination and cooperation, the Government needs to establish **a Commission (Committee) on persistent organic pollutants under the Council on Sustainable Development of the RK or under the Ministry of Environment of the RK and National (subregional) Center on Stockholm Convention on POPs (NCPOPs) as a legal body.**

The task of the **Center on the Stockholm Convention on POPs (NCPOPs) [Center on Chemical Safety]** shall be the implementation of control and evaluation of the NIP realization as well as decision-making on its assessment and renewal. Other important task of the Center is to introduce elements of the NIP realization into other national strategies, political decisions and plans. Should the establishment of the Center on Chemical Safety be approved, it shall coordinate the implementation of the international obligations of Kazakhstan under the Stockholm Convention, Rotterdam Convention, Aarhus Protocol concerning hazardous chemicals and thus provide cooperation, increased cost effectiveness, transparency, improvement of accountability and mutual development. The Ministry of Environment of RK shall reform the current Office on project implementation into an independent legal organization – the Center on Persistent Organic Pollutants.

The NIP shall complement the current types of national activity in relevant spheres, cooperating with concerned ministries and departments in the sphere of collection and storage of obsolete pesticides and in the implementation of a detailed inventory on POPs. Necessary conditions for cooperation with other international projects shall be created.

Some types of NIP activities are expensive. In this connection the adequate technical and investment support from the national and international organizations is one of the most important conditions of successful NIP realization.

The Government of Kazakhstan needs technical assistance in the following spheres:

- Improvement, increase of the level of national and international legal structures for activities in the POP sphere and development of the financial mechanisms;
- Provision of support to the Center on the Stockholm Convention on POPs (NCSC) [Center on Chemical Safety] in the sphere of NIP realization, evaluation and development of accountability on NIP, development of the coordination with other projects of IMF and projects with two-sided financing;
- Establishment of a national information system (expansion of the database with accurate and constantly updated information on POPs); increase of potential of the Center on the Stockholm Convention on POPs [Center on Chemical Safety] in the sphere of processing and provision of data;
- Enhancement of monitoring in the sphere of the environmental protection and health care, including development of reports and analyses;
- Provision of support to the energy sector in the sphere of identification of PCBs in electrical equipment and implementation of further activities on PCBs elimination;
- Carrying out of training for enterprises personnel;
- Provision of support in the sphere of identification, management and decontamination of polluted areas;
- Studies of the potential for the implementation of planned activities;
- Development and introduction of programs on public awareness based on the principle "the public has a right to know and participate".
- International financial support is necessary for such planned activities on decontaminaiton of the polluted territories as:
    - Provision of the materials for repacking obsolete pesticides;
    - Elimination of obsolete pesticides;
    - Elimination of PCBs-containing oil and PCBs-polluted equipment (e.g., capacitors) and wastes;
    - Decontamination of the polluted territories.

Evaluation of the implementation progress is an important component of the NIP. The process shall be assessed and one shall evaluate in which stages of activity implementation the set goals were achieved. This should be done in order to understand what components of NIP should be renewed. The implementation evaluation should be carried out through methods that provide transparency of involvement of all partners. The results of the evaluation shall be accessible to the public.

The NIP shall include a set of evaluating criteria necessary for evaluation of the progress, its effectiveness and implementation problems. The Center on persistent organic pollutents [Center on Chemical Safety] shall be a responsible link for collection of necessary information, for evaluation of needs of appropriate implementation, for evaluation of the progress and obstacles during the activity process. The

Center on the Stockholm Convention on POPs [Center on Chemical Safety] shall regularly report on the results of the evaluation activity to the Ministry of Environment of RK. It is necessary to develop a stable system of accountability and carry out trainings for representatives of all involved parties.

Ministries and other governmental departments shall be responsible for monitoring and evaluation of the activities of their subordinate sectors. The received results shall be taken into consideration during appropriate decision-making. Local authorities shall be responsible for monitoring and evaluation in the spheres that are under their jurisdiction. Executive agencies of certain projects shall be responsible for monitoring of the activity implementation in their sphere and for project reports.

The goal of the asssessment of the indicators is to define tendencies and the level of impact the NIP has on the environment. The majority of the indicators give a quantitative assessment of the implementation process, but it is also necessary to include qualitative indicators for assessment of activity implementation (e.g., assessment of the population attitude to the POPs problem) received through public-opinion polls and relevant studies. In addition, the NIP shall include solutions regarding various institutional problems which need a qualitative assessment rather than a quantitative evaluation. The verified indicators of the NIP may include the following indicators (but not necessarily be limited by them):

- Amendments in accordance with the requirements of the Stockholm Convention shall be introduced into the national structure of the legislation and regulation;
- Specific guidelines/instructions on the development of a legal and regulatory structure;
- Development of the informational system on POPs and provision of its functioning;
- Development of the educational system;
- Quantity of the specialists trained;
- Volume and percentage ratio of obsolete pesticides that were repacked and transfered to a new storage place;
- Volume of the obsolete pesticides accumulated in private households;
- Quantity and percentage ratio of the electric equipment, checked and labelled for its PBCs;
- Quantity of the energy enterprises checked by the Committee of the Environmental Control of the Ministry of Environment of the RK;
- Quantity and percentage ratio of unused capacitors stored in appropriate conditions;
- Quantity of areas studies for POPs pollution;
- Quantity of activities carried out on awareness, information and education of the public;
- Quantity of environmental samples taken for studies on POPs content;
- Quantity of studies on the sanitary and epidemiological situation;
- Quantity of organizations involved into the process of information exchange and responsible for reports.

Reliability of the data shall be verified by the assessment reports of the Center on Persistent Organic Pollutants [Center on Chemical Safety]. The results of the assessment: (1) shall be used for NIP updating, as well as its policy and strategy on chemical safety; (2) shall help to make the policy in this sphere more transparent. They shall be distributed among the public organizations (at different levels), in the private sector, among outside donors, in the mass media and public. All these activities shall be reflected in Annual State Reports on the Environment and on the web-sate of the Center on Persistent Organic Pollutants [Center on Chemical Safety].

The NIP is not a one-time established document; it shall be regularly reviewed, for example every 5 years. This process is closely connected with the assessment of the activity implementation. The main responsibility for the NIP realization is given to the Center on Persistent Organic Pollutants [Center on Chemical Safety].

3.2. Activity, strategies and action plans

3.3.1. Institutional measures and measures on regulation enhancement

Strategic directions of the National Implementation Plan on the obligations under the Stockholm Convention on persistent organic pollutants in the sphere of legislation.

It is obvious that in general the provisions of the Kazakhstani legislation in the sphere of hazardous wastes management should be based on international guidelines, including those approved by the European Parliament and analogous documents adopted in the developed countries and CIS.

To implement the obligations under the Stockholm Convention it is necessary to develop coordination between certain departments dealing with the same issues.

Implementation of the obligations under the Stockholm Convention and implementation of the POPs inventory at the national level shall have a legal basis which reflects the responsibility of the physical and legal bodies in this sphere.

It is necessary to introduce amendments into the legislation of the Republic of Kazakhstan in compliance with the provisions of the Stockholm Convention (legislation in the sphere of environmental protection, health care, plant protection and other normative acts).

Ecologically sound POPs waste management. The National Implementation Plan on the obligations

under the Stockholm Convention on persistent organic pollutants shall be based on a principle of ecologically sound POPs waste management. This means that adoption of possible practical measures to eliminate hazardous wastes shall be implemented in a manner which aims to protect human health and the environment from the possible negative impact of such wastes.

Solution of the problem of ecologically sound POPs waste management shall be carried out in three main directions:

1. Prevention of new accumulation of POPs.
2. Utilization, decontamination and elimination of the accumulated POPs.
3. POPs monitoring.

Outlined directions stipulate an analysis of the current legal regulatory basis of the relations in the sphere of POPs management. The purpose of the analysis shall be to find effective ways for elimination of the negative impact of POPs on the environment and human health. The analysis shall primarily deal with storage, decommission, transportation, decontamination and elimination of these chemicals as well as implementation of the state inspection and control over the listed operations.

Analysis of the status of the normative and methodological basis in the sphere of safe management of hazardous wastes in the Republic of Kazakhstan proves the absence of state waste management systems establishing the monitoring, storage and decontamination of hazardous waste.

A conceptual approach to the sphere of waste management, including POPs, is defined by the global strategic documents (the Stockholm Convention on Persistent Organic Pollutants, Basel Convention on the Control of Transboundary Movement of Hazardous Wastes and Their Disposal) and the policy of the Ministry of Environment and Ministry of Health of the Republic of Kazakhstan.

Monitoring of pollution of environmental components by POPs is one of the major types of international activities and legislative activities taking place at the national level.

The status of soil pollution, including POPs, should be defined by the standard indicators, through the use of unified standard procedures that guarantee the quality of the implementation of the laboratory studies. Main directions of soil pollution monitoring shall be: soil erosion, reduction of soil fertility, distribution of pollution and loss of biodiversity. Soil pollution is an important element that influences the soil quality and defines its degradation.

Analogous approaches shall also be applied to the pollution of air and water by hazardous wastes, including POPs.

In the sphere of sanitary and epidemiological welfare of the population the state policy on protection of human health from a negative impact of the hazardous wastes including POPs is based on the provisions of the Law of the Republic of Kazakshtan "On Sanitary and Epidemiological Safety of the Population".

3.3.2. Measures on reduction or elimination of releases under the intentionaly production and use

The National Implementation Plan of the Republic of Kazakhstan, under the obligations of the Stockholm Convention, includes short- and long-term activities.

Short-term activities include:

- implementation of a detailed inventory and selection of priority sources of environmental POPs pollution in the agricultural, industrial, transport and other sectors;
- thorough studies of Kazakhstan regions for presence of POPs pesticides in the environment, dioxins, furans and polychlorinated biphenyls in the releases of industrial enterprises, communal services and exhaust gases.

Long-term activities envisage:

- organization of control systems for environmental POPs pollution in regions with the most dangerous ecological situation;
- development of a program on the regulation of production, import, export and on the rational use of chemicals;
- disposal/utilization of POPs.

3.3.3. Production, import and export, use, stockpiles and wastes of pesticides containing POPs and listed in Annex A (chemicals, included into Annex A, Part I).

Action Plan of the Republic of Kazakhstan on pesticide wastes

The problem of pesticide wastes (obsolete and useless pesticides), 10 of them containing pesticides with POPs properties, is a major environmental-social problem. Currently POPs wastes are stored in many cases in destroyed storehouses and at dump sites that may cause a great environmental problem for future generations. The considerable amount of such waste, the storage conditions, the state of the packages, the possibility of free access and the uncontrollable household use of these, increase the risk these wastes pose to the population and environment. Risks related to natural and technological emergency situations (floods, fires, great emergencies and others) are of particular concern.

Summary of the activities on pesticide wastes including POPs-pesticides:

1. Development of a full register of obsolete and useless pesticides including POPs-pesticides.
2. Assessment and updating of the normative-legislative base.
3. Assessment of POPs pesticides proposed for inclusion into the list of chemicals under the Stockholm Convention.
4. Construction of storehouses for temporary storage of pesticide wastes.
5. Transfer into other containers.
6. Collection and delivery of wastes to a place of disposal or temporary storage.
7. Elimination of wastes.
8. Decontamination of the territories polluted by pesticide wastes.

NAP activities on pesticide wastes:

Performance indicators (table. 4):

Table 4

Task	*Indicator*
1. Establishment of IAC on management of POPs-pesticides (2010)	Resolution of the Government on establishment of IAC and a provision on its activity (2007).
2. Development of a unified register format by 2010	A register format adopted in accordance with the current legislation (2008).
Detailed inventory of pesticide wastes by 2010	Documented reports on inventory.
4. Development of a register on pesticide wastes by 2010	Register on pesticide wastes including POPs-pesticides.
5. Development of a legislative base on pesticide wastes	**Option 1.** Special legislation on POPs as consumption wastes with a section on pesticides. **Option 2.** Making corrections in the current legislation. **Option 3.** Defining the problems of pesticides to be eliminated, in the Environmental Code of the Republic of Kazakhstan.

Budget for the activities on elimination pesticide wastes *(Table 5):*

Table5

Inventory, construction of storehouses, replacement into other containers, collection and delivery to the place of elimination, elimination, decontamination

#	Activity
1	Inventory (examination of the storehouses at 80% of the territory not covered by the preliminary inventory)
2	Identification of samples taken at inventory
3	Identification of disposed pesticides
4	Construction of storehouses for temporary storage of pesticides
5	Transfer into other containers
6	Collection and delivery to the place of elimination
7	Elimination of POPs-pesticides
8	Scientific studies on development technologies on decontamination of soils polluted by pesticide wastes, including POPs-pesticides
9	Decontamination of soils polluted with pesticides

Total			

Schedule on implementation the work on pesticide wastes elimination:

Table 6

#	Activity	Term of implementation	Responsible body
1	Inventory (examination of the storehouses at 80% of the territory not covered by preliminary inventory).	2010 - 2012	MEP RK, MA RK, MH RK, OTD EP, OTD MA, local executive authorities, technical assistance
2	Development of a full register on pesticide wastes.	2011- 2012	**Commission (Committee) on Persistent Organic Pollutants under the Council of Sustainable Development RK or MEP RK and the the National (subregiona)Center on POPs or as a legal body**
3	Identification of samples taken at inventory	2010 2011	MEP RK, MA RK, MES RK, MH RK, technical assistance MEP RK
4	Indentification of disposed pesticides	2010 2011	MEP RK, MA RK, MES RK, MH RK, technical assistance
5	Construction of storehouses for temporary storage of pesticides	2012 2013 2014	MEP RK, MA RK, local executive authorities
6	Transfer into other containers	2012 2013 2014	MER RK, MA RK, local executive authorities
7	Collection and delivery to the place of elimination	2018 2019 2020	MER RK, MC RK, local executive authorities
8	Elimination of POPs-pesticides	2018 2019 2020	MEP RK, MA RK, specialized enterprises
9	Scientific studies on development technologies on decontamination of soils polluted by pesticide wastes, including POPs-pesticides	2007-2015	MEP RK, MES RK
10	Decontamination of soils polluted with pesticides	2018 - 2025	MEP RK, MA RK, local executive authorities MEP RK

3.2.4. Production, import and export, use, identification, labelling, decommission, storage and disposal of PCBs and PCBs-containing equipment (chemicals listed in Annex A, Part II).

Action Plan of the Republic of Kazakhstan on Safe Management, Storage and Elimination of PCB-containing Equipment and Wastes

Problems and gaps:

1. Not the whole territory of RK was covered by the inventory.
2. Lack of a management, monitoring and control system related to PCB -containing equipment.

3. Lack of a normative basis on environmentally safe management of operational equipment (rules and instructions).
4. Lack of trained personnel being able to conduct monitoring and control of maintenance equipment at enterprises and by supervising bodies.
5. Lack of specialized structures for temporary storage of PCB-containing equipment and wastes.
6. Many enterprises have PCB-containing equipment, practically in all regions of the republic. The major number of the equipment is concentrated in Central and Eastern Kazakhstan. It is necessary to identify the number and location of storehouses used for temporary storage.
7. A part of the written off equipment is ownerless; and part of it is the property of enterprises. It is necessary to define at whose expense the temporary storages will be constructed.
8. Lack of technologies on elimination of materials and wastes containing POPs.

Performance indicators (table 7):

Tasks	Indicators
1. Development of normative requirements regulating turn and use of PCB-containing equipment.	Adoption and registration of normative requirements at the Ministry of Justice -2012.
2. Making a detailed inventory of PCB-containing equipment in the republic, including in institutions under the Ministry of Defense.	A complete register of PCB-containing equipment - 2012.
3. Examination of industrial dumps to identify PCB-containing equipment and PCBs-contaminated territories	List of industrial dumps -2012 List of PCB-containing equipment with location at the dump sites - 2012 List of the territories polluted with PCBs at the dumps of liquidated enterprises - 2012
4. Establishment of a center on training personnel of enterprises and supervising bodies on PCBs management	Functioning of the center -2012
5. Defining of places for construction of PCBs-containing equipment storages, to 2012	Approval of storage sites by the competent bodies
6. Organization of storages, to 2014	State commission storage acceptance report - 2014
7. Preparation of PCBs-containing equipment for transportation – to 2014	Acceptance reports on implemented works on packaging and labeliing of PCBs-containing equipment - 2014-2015
8. Transportation of PCBs-containing equipment to storage sites – 2014	Storage acceptance reports - 2014-2015
9. Decontamination of polluted territories	Acceptance reports on implemented works - 2018 - 2025
10. Construction of a plant for elimination of the equipment and wastes containing PCBs	Acceptance reports on implemented works - 2018
11. Elimination of PCBs-containing equipment and wastes	Acceptance reports on implemented works - 2018-2025

Preparation of new normative acts and updating of the existing normative basis:

1. Preparation of normative acts regulating treatment of PCB-containing equipment (use, phasing out, storage and transportation of PCB-containing equipment).
2. Amendming the existing resolution introducing prohibition of import, export and selling of PCB-containing equipment.
3. Preparation of normative acts on organization of temporary storages
4. Preparation of a schedule and the order of removal and temporary storage of disassembled equipment (according to the attached list of enterprises).

5. Defining privileges and preferences for enterprises temporary storing PCB-containing equipment.
6. Defining certain issues in the legislation - who should develop, introduce and use installations for PCB elimination.
7. To limit and prohibit economic activity on polluted territories.

Development of normative-legal documents:

1. Rules and instructions on the use of PCB-containing equipment (record, that in case of breakdown, it is not subject to repair).
2. Rules and instructions on phasing out of equipment.
3. Rules and instructions on the storage of disassembled PCB-containing equipment and wastes at enterprises (on the basis of existing instructions, treatment according to the instructions concerning substances of 1 hazardous class 1).
4. Rules and instructions on transportation to places of temporary storage.
5. Instructions on the storage of PCB-containing equipment at storehouses for temporary storage (acceptance reports, location).
6. Instruction on the technology of elimination (all instructions and rules should be published together as a reference book).

Detailed inventory:

1. Complete list of industrial enterprises of the 90s.
2. Inventory of liquidated enterprises and industrial dumps.
3. Establishment of a specialized laboratory with equipment, measurement means (SI), methodology on making measurements (MVI), state standard samples (GSO) and SI, MVI, GSO introduced into the state register. Financing from the state budget (the best option - organization under MEP or in the structure of the national center). Options of use of a laboratory infrastructure of leading industrial enterprises (Aluminum of Kazakhstan joint-stock company, oil companies and others).

System on monitoring and control management:

1. Establishment of a center on training the personnel of enterprises and supervising bodies on PCB management.
2. Monitoring at enterprises:
    a. monitoring of the condition of the equipment and its content;
    b. monitoring of polluted territories and wastes (taking samples, limit of access);
    c. selective analysis at specialized laboratories;
    d. labeling.
3. Control - reporting to OTDMEP and inspections.
4. State temporary storages.

Temporary storage of disassembled equipment

1. Defining locations for temporary storage of disassembled equipment (taking into consideration existing structures and the construction of new ones, disposal sites):
    a. at enterprises;
    b. at state storages (ownerless and small privately owned companies).
2. Construction and maintenance of temporary storages.

Schedule on implementation of activities related to the elimination of PCB-containing equipment and wastes

Table 8

#	Activity	Term of implementation	Responsible body	Executor

1	Establishment and operation of the National or Subregional Center on POPs under MEP (RGP or RGKP status with budget financing).	2010-2028	MEP RK	MEP RK
2	Development of normative requirements regulating turn, use, storage and elimination of PCB-containing equipment and wastes.	2010-2012	MEP RK	National Center
3	Making detailed inventory of PCB-containing equipment in the republic, including the institutions under the Ministry of Defense.	2010-2012	MEP RK	MIL, MEMR OTDMEP, National Center
4	Examination of industrial dumps to identify PCB-containing equipment and PCB-contaminated territories.	2010-2012	MEP RK	MIL, akimats, OTDMEP, NGO, National Center
5	Establishment of a center on training personnel of enterprises and supervising bodies on PCB management.	2011-2012	MEP RK	National Center
6	Organization of temporary storages at enterprises	2012-2014	MEP RK	Owners of equipment
7	Defining of locations for construction of state storages for PCBs-containing equipment.	2010-2011	MEP RK	National Center
8	Organization of state storages	2012 -2014.	MEP RK	
9	Scientific studies on development technologies on elimination of PCB-containing equipment and wastes and rehabilitation of polluted soils	2007-2015	MEP RK	MES RK NII National Center
10	Rehabilitation of polluted territories	2018-2025	MEP RK	Contractors National Center
11	Selection of technology on elimination of PCB-containing equipment and wastes	2010-2011	MEP RK	National Center
12	Construction of a plant for elimination of equipment and wastes containing PCBs	2015-2018	MEP RK	General Contractor National Center
13	Preparation and transportation of PCB-containing equipment for elimination	2018	MEP RK	Owners of equipment National center
14	Elimination of PCB-containing equipment and wastes	2018-2025	MEP RK	Plant on elimination of POPs. National Center

3.2.5. Production, import and export, use, stockpiles and wastes of DDT (chemicals listed in Annex B)

In the Republic of Kazakhstan there is no DDT production, import or export. DDT stockpiles are disposed at disposal sites.

3.2.6. Register of certain exemptions and required exemptions (Article 4).

Not being a country-producer of POPs, Kazakhstan does not have any reasons to enter the Register of certain exemptions. An appropriate letter on behalf of the Ministry of Health of the RK was submitted to the Secretariat of the Stockholm Convention on POPs in 2004.

3.2.7. Action Plan on measures to reduce releases as a result of unintentional production

Action Plant of the Republic of Kazakhstan on measures to reduce releases as a result of unintentional production

Development of the monitoring and management system shall be a top-priority task for the republic in the near future. In this connection, the following activities are necessary:

1. Development of the normative and legal basis.
2. Carrying out of a detailed inventory of the sources of dioxin and furan releases.
3. Establishment of a dioxin laboratory.
4. Monitoring and compilation of the annual register of dioxin and furan releases.
5. Activities on reduction of dioxin and furan releases.

Activities of the NAP on unintentional POPs releases:

1. Establishment of the normative and legal basis.

The legislation of the Republic of Kazakhstan does not reflect issues connected with dioxins and furans due to the recent emergence of the issue in Kazakhstan.

2. Carrying out a detailed inventory of the sources of dioxin and furan releases During the detailed inventory it is necessary to fully cover the following categories of releases of unintentional POPs that do not have complete information:

- Enterprises of the energy sector (all small boiler houses and gas-turbine units).
- Enterprises of the engineering sector (with smelting kilns).
- Enterprises of the wood processing industry (waste incineration).
- Enterpises on cable thermal processing.
- Enterprises of the food industry (that have smokehouses).
- Medical enterprises - clinics, hospitals, medical stations, veterinary service facilities (that incinerate medical wastes and animal carcasses).
- Enterprises within the transport service sector (utilization of exhausted machine and transformer oil).
- Urban and rural communal dumps, industrial waste sites.
- Domestic stoves in private households.
- Cases of intentional burning of agricultural lands and wastes of agricultural production.

3. Establishment of a dioxin laboratory.

Currently there is no a laboratory on identification of dioxins and furans in the republic. The cost of equipment of the laboratory, according to Russian sources, is US$ 1 mln. Maintenance and analyses as well as necessary reagents are expensive. As a result, the cost of an analysis abroad is US$ 1,000, in the

Russian Federation and for Russian enterprises - US$ 500.

Along with this, during the implementation of the RK obligations under the Stockholm Convention, at least, periodic analysis of the unintentional releases of the enterprises is needed in order to monitor dioxin and furan releases. Moreover, when establishing an enterprise on POPs disposal (pesticides with POPs properties, PCBs-containing equipment) on the territory of Kazakhstan, control of dioxin and furan releases is required. In this regard, it is necessary to create a dioxin laboratory which can serve the whole Central Asian region.

4. Monitoring and compilation of the annual register of dioxin and furan releases shall be a prerogative to the dioxin laboratory. The monitoring shall be carried out at the expense of the republican budget.

5. Activities on reduction of dioxin and furan releases. Activities on reduction of PCDD/PCDF releases consist, chiefly, of replacement of originally used materials and raw materials, modification of technological processes (including maintenance and operation monitoring and re-equipment of the current production). Possible and accessible activities which could be carried out separately and in a combination include the following:

- primary precautionary measures during the selection of materials;
- primary precautionary measures during the process;
- precautions for gas release;
- technology of purification of released gases;
- procedures on the processing of left-overs.

To introduce the best available technologies (BAT) and the best environmental practice (BEP) and reconstruct current production methods – the sources of dioxin and furan releases – an analysis of currently applied technologies for gas emission, is necessary. Such analysis and recommendations development as well as studies of advanced foreign experience and innovation technologies, search and transfer of BAT from foreign investors or donors to domestic enterprises shall be a responsibility of the National Center under the Stockholm Convention.

Schedule of implementation the activities on reduction of dioxins and furans releases

Table 9

#	Activity	Term of implementation	Responsible body	Executors
1	Development of normative requirements on dioxin and furan releases	2008	MEP RK	National Center
2	Detailed inventory of dioxin and furan releases sources	2008-2009	MEP RK	OTDEP, National Center
3	Establishment of a dioxin laboratory	2009	MEP RK	National Center
4	Monitoring and development of an annual register of dioxin and furan releases	2010-2028	MEP RK	OTDEP, National Center
5	Analysis of the existing system of decontamination of associated gases of enterprises and development of recommendations on introduction of the best available technologies and the best environmental practices (BAT & BEP) for reduction of dioxins and furans releases	2010 – 2020	MEP RK	National Center
6	Reconstruction of the existing technologies and introduction of BAT & BEP	2020-2028	MEP RK	Enterprise
7	Establishment of industrial facilities on processing of medical	2015-2028	MEP RK	Contractor

	and domestic wastes considering BAT & BEP			

3.2.8. Strategy on measures to reduce releases from stockpiles and wastes (Article 6)

Burial of pesticides with POPs characteristics was carried out in a chaotic and uncontrolled manner, which greatly complicates the work on their disposal.

Insecticides were buried without prior detoxication since 1971, when the sale of these chemicals was prohibited. The chemicals were buried in the areas far from settlements; however, 30 years later it is difficult or even impossible to find these burial areas.

Chlorine-containing organic chemicals, including DDT and aldrin, were used as pesticides but the Government of Kazakhstan prohibited sale of these chemicals in the 1970s because of their toxic characteristics and once their ability to accumulate in tissues of living organisms was shown. At that time it was decided to bury the chemicals by small amounts in various places.

3.2.9. Strategy of identification of the polluted areas (chemicals listed in Annexes A, B and C) and their ecologically sound regulation.

Action Plan of the Republic of Kazakhstan on POPs-polluted territories

Strategic goals of the NAP in the sphere of polluted territories management.

- A basis for polluted territories management is a detailed inventory in these areas with a consequent analysis of the environmental threat and an evaluation of the remediation needs. It is also necessary to provide an estimate of the economic feasability of remediation activities.
- A detailed inventory of the situation in the polluted territories is necessary in order to prevent further pollution due to leaking, evaporation or pollution of the environment as a result of natural disasters such as floods, in the case of which special preventative measures should be developed.
- Identification of methods on recultivation of the polluted territories:
  - removal of the polluted soil and packing it into air-sealed containers for further transportation to a disposal ground;
  - biological recultivation of the polluted territory.
- Identification of methods of polluted soil disposal:
  - organization of disposal in the industrial enterprises of Kazakhstan (OJSC "Mittal Steel Temirtau", cement plants);
  - organization of a new production on the territory of Kazakshtan for disposal of PCB-polluted soil;
  - export and disposal of PCBs-polluted soil [to another country (Russia, Slovakia, Switzerland, France, Germany, etc.)].

3.2.10. Facilitation or development of the information exchange and involvement of the concerned parties

- Organization of an intersectoral group that includes representatives of state structures, business and NGOs.
- Initiation of industrial and professional users in information providing (reduction or elimination of POPs sources, POPs emissions).
- POPs alternatives, including information concerning risks as well as economic and social costs).

3.2.11. Public awareness, information and education (Article 10)

During the NIP development a low level of awareness on POPs sources and their impact on health was revealed. Providing information on the POPs issue had a general informational nature but was not preventative or educational.

The following measures appear to be advisable:

- training of workers, scientific, educational, technical and management personnel;
- preparation of materials for education and public awareness at national and international levels and their exchange;
- taking into account various levels of knowledge and interests of the public, it is recommended to develop individual materials and guidelines for different target groups (teachers, students, doctors, personnel of the state bodies, scientific workers and others);
- provision of public access to the information on persistent organic pollutants and its regular updating;
- education of the society shall be realized not only through the information on POPs and their impact on the environment and health but also on methods and means to reduce the POPs pollution.

3.2.12. Efficiency evaluation

The organization responsible for implementing the NIP of the Republic of Kazakhstan shall be the Ministry of Environment Protection of the RK. Executive organizations shall be responsible for carrying out certain activities. To assess the efficiency the organizations-executors shall prepare general reports on implemented activities. The reports shall include the description and outcomes of the NIP activities. At the same time, the Ministry of Environment of RK shall execute controlling functions.

The MEP of RK shall also create a system of monitoring of the ecologically sound management of persistent organic pollutants in Kazakhstan as a part of USEMS. For environmentally safe management of operating PCBs-containing equpment it is planned to create a control system relating to their condition and storage. It is planned to develop an annual Register of POPs releases not only of industrial enterprises but also of communal services (fires of residential and industrial buildings, dumps, municipal solid waste landfills, etc.).

Reduction of POPs levels in the environment and foodstuffs shall demonstrate a successful implementation of the action plans suggested in the NIP. If the efficiency evaluation shows that the POPs risk is not insufficiently reduced, then the following measures might be taken.

Assessment of efficiency shall also cover issues concerning the cost effectiveness of the NIP. It shall also include an evaluation of how the selected approach and actions reduce the POPs risk in an economic sense.

The evaluation shall be carried out on the basis of the available scientific, environmental and technical information that includes:

a. reports and other information on monitoring, submitted in accordance with the provisions of Paragraph 2;
b. national reports submitted in accordance with Article 15; and
c. information on non-compliance received according to the procedures set in Article 17.

NIP outcomes shall be presented in the reports on implementation effectiveness. Taking into account the NIP structure, action plans and requirements to the reports to the Conference of the Parties on the Stockholm Convention on POPs, Kazakhstan shall adopt a schedule of progress reports submission (*Table 10*).

Table 10

Schedule of submission of reports on implementation of the obligations under the Stockholm Convention on POPs

Year	Activity	Outcome	Compliance with a preliminary date of the Conference of the Parties (CP)
First stage of the NIP implementation *(2010-2014)*:			
2009	Approval of NIP on POPs	Presentation of the NIP to the Conference of the	CP-4

		Parties	
2010			
2011	Assessment of the short-term action plan	Evaluation report of the short-term action plan	CP-5
2012			
2013	Assessment of implementation efficiency	Report on implementation efficiency	CP-6
Second stage of the NIP implementation *(2015-2017)*:			
2014			
2015			CP-7
2016			
2017	Assessment of the medium-term action plan	Medium-term action plan (Progress is established by comparison with the goals of the NIP action plans. A special focus is on dioxins and furans).	CP-8
Third stage of the NIP implementation *(2018-2028)*:			
2018			
2019			CP-9
2020			
2021			CP-10
2022			
2023			CP-11
2024			
2025	Assessment of the long-term action plan	Long-term action plan (Progress is compared with the goals of the NIP action plans).	CP-12
2026			
2027			
2028			

3.2.13. Accountability

Kazakhstan shall, in a special format, present national and topical reports that cover implementation of the Convention provisions to the Conference of the Parties. Requirements to the reports and terms are given in Table 11.

Table 11

Mandatory requirements to reports and their frequency in compliance with the Convention provisions

Major requirements of the Stockholm Convention on POPs	Description of the requirements	Frequency
Article 5 "Measures on reduction or elimination as a result of unintentional production": Paragraph (a):	Each party shall develop an implementation plan or, if it is necessary, a regional or subregional action plan and shall further implement it in accordance with the component part of the implementation plan indicated in Article 7, designed for identification, properties	Kazakhstan shall transmit its National Implementation Plan to the Conference of the Parties within 2 years of the date on which this Convention enters into force for it.

	characterization and solution of the issues of emission of the chemicals listed in Annex C, as well as for facilitation of implementation of Subparagraphs b) -e).	
Article 5 "Measures of reduction or elimination as a result of unintentional production": Part (V) of Paragraph (a):	Review of strategies implementation progress and achieved success in the implementation of the obligations envisaged within this paragraph; such reviews are included into the reports submitted in accordance with Article 15.	Every 5 years.
Article 7: Action plans	Each Party shall develop and endeavour to implement the implementation plan of its obligations under the Convention; shall review and update the NIP; shall, where appropriate, cooperate directly or through global, regional and subregional organizations, and consult their national stakeholders in order to facilitate the development, implementation and updating of their implementation plans; shall endeavour to utilize and where necessary, establish the means to integrate national implementation plans for POPs in their sustainable development strategies where appropriate.	Kazakhstan shall transmit the NIP within 2 years of date on which this Convention entered into force for it; shall review and and update as appropriate its implementation plan on a periodic basis (every 4 years) and in accordance with the procedure specified by the decision of the Conference of the Parties.
Article 15: Information provision	Each Party shall submit to the Conference of the Parties the information on measures adopted by it on the implementation of the Convention provisions and on effectiveness of such measures to achieve the Convention goals. Each Party shall submit to the Secretariat: a) statistic data on the total volumes of its production, import and export of each of the chemicals listed in Annexes A and B, or an actual evaluation of such data; and b) as far as practically possible, a list of the states from which each of these substances was imported, and the states to which it exported each of these substances	In accordance with the procedures specified by the decision of the First Conference of the Parties
Annex A, Part II, Paragraph (g): PCBs	Every 5 years each party shall	Every 5 years

	submit a progress report on elimination of the production and use of PCBs in accordance with Article 15.	

Table 12

Schedule of submission of the reports of the Republic of Kazakhstan in accordance with the requirements of the Stockholm Convention after the Convention ratification by the Republic of Kazakhstan

010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
	KC-5		KC-6		KC-7		KC-8		KC-9		KC-10		KC-11		KC- 12
Entry into force of the Stockholm Convention onPOPs for the Republic of Kazakhstan.	I National report. Review of the strategies on reduction of unintentional POPs releases		Assessment of the efficiency of the implementation	Progress report on elimination of PCBs use	II National report. Review of the strategies on reduction of unintentional POPs releases		Assessment of the efficiency of implementation		Progress report on the elimination of PCBs use	III National report. Review of the strategies on reduction of unintentional POPs releass			Progress report on the elimination of PCBs use	III National report. Review of the strategies on reduction of unintentional POPs releases	Assessment of the efficiency of the implementation

3.2.14. Strategic goals on research, development and monitoring (Article 11)

Scientific activity seems to be directed in the following direction:

Space monitoring of unintentional POPs releases. Thermal pollutants during the incineration of wastes of oil and gas products pose a great threat as sources of environmental pollution in Kazakhstan. Solid and gas chemicals are released into the air. They include not only sulphur, carbon and nitrogen dioxides and hydrocarbons but also persistent organic pollutants. A part of thermal pollutant emissions is due to the technological specifics of oil or gas extraction (gas flaring used for combustion of the accompanied gas, etc.), and a part is due to emergency situations (fire of barns during the power outage, combustion of petroleum leaks, etc.).

Unlike gas flaring used during the combustion of the accompanied gas and not accompanied by POPs releases, the most urgent problem relates to spontaneous and emergency fires leading to incineration of wastes of oil and gas production: wastes of oil and gas production are sources of releases of persistent organic pollutants.

To track spontaneous and emergency fires it is advisable to introduce a system of satellite monitoring. Such monitoring can help the controlling authorities to find thermal sources of pollution of the landscape that appeared spontaneously, defining time of their activity and power.

The Institute of Space Studies of the Ministry of Education and Science of the RK has experience in interpretation of data of remote sensing which allows solving a number of problems connected with this subject. The system of meteorological satellites of low resolution NOAA/AVHRR gives information on the earth in five spectral channels: two visible and three infra-red (ch1 0.58-0.68 Oj; ch2 0.725-1.1 Oj ; ch3 3.55-3.93 Oj; ch4 10.3-11.3 Oj; ch5 11.5-12.5 Oj) with coverage of 2.700 km and resolution at nadir distance of 1.1 *km*. Sensibility of the AVHRR scanner in the thermal channels allows one to see temperature differences of

0.1^{o}C and to define the absolute temperature with a precision of 0.2 ^{o}C. At present, in the orbit there are three operating NOAA satellites 10,12,16 with an orbital period of 90 *min.* The sensibility of the AVHRR scanner provides an opportunity to record thermal sources of 50 m^2 radius with the spectral-brightness temperature exceeding 2000^{o}C (gas flare). In this case, the average temperature in the radius of 1 km^2 (minimal assessed area) will increase to 0.1 ^{o}C. During a large oil fire the image shall fix not only zones of increased temperature but also adjacent zones of lower temperature caused by the cold top edge of smoke clouds.

A new satellite system is equpped with gipospectral scanner MODIS (36 spectral channels) with resolution 250 *m*, 500 *m* and 1000 *m*. Currently the first satellite of this system (TERRA) is in orbit. The scanner coverage is 2,200 *km* and it has a spectral resolution 4 times better than the AVHRR scanner. Supposedly, the sensitivity of the thermal channels (channels в„– 20-36) will allow it to record thermal sources with a total area of gas flare 25 m^2. The accuracy of identification can significantly improve with the use of additional ground cartographical information on location of the developed oil and gas fields.

Activities on distant night and day analysis of the capacity of thermal sources producing persistent organic pollutants in the oil and gas sectors, are realistic. Through this method constantly active sources of waste combustion in the oil and gas industry, their radiobrightness temperature and temporary activity (emergency or instantaneous), sources of combustion, time of activity, area and temperature characteristics on the historical space information of any of the specific years can be revealed.

With these purposes it is necessary to analyze a number of testing sources in the regime of every day monitoring of the data of 24-hour survey of the satellite system HOAA to accumulate information on possibilities of DDZ in the assessement of the dynamics of length and capacity of thermal releases. With the help of MODIZ space information the area characteristics of the territories subjected to fire impact can be verified.

Realization of such projects shall facilitate the developement of a geographical informational system (GIS) that connects cartographical information on the oil and gas fileds with the data of the satellite monitoring. This system shall track regular and emergency thermal regimes of functioning of these objects and provide operational and objective information on the regimes of their functioning.

3.2.15. Technical and financial assistance (Articles 12 and 13)

Kazakhstan belongs to the group of countries with economies in transition and, as mentioned in Article 12 of the Convention, to the countries that receive technical and financial assistance. Transitional Euro-Asian geopolitical situation of the country allows Kazakhstan to receive technical and financial support both from a traditional donor – EU – as well as countries of the Asian-Pacific region. At the same time, the economic transition might end in the future decade. A proof to this is the advanced development rate of the country among the CIS countries, the income level and GDP per capita and the strategic goal declared by the President of the country - entry of Kazakshtan into the group of 50 most developed countries in the nearest future. In the aspect of the Stockholm Convention this means that Kazakhstan will transfer from a recipient Party to a donor Party. This change might happen in the time frame set in the NIP.

Taking into account a short period of activities on the NIP in respect of technical and financial assistance, appropriate targeted projects for co-financing and cooperation with the financial mechanism of the Convention - GEF will be developed. However, Kazakhstan shall take an active part in the activities of the Conference of the Parties to promote the provisions concerning technical and financial assistance. Professional support of any initiatives planned by the regional or subregional centers defined according to the Convention shall be expanded.

3.3. Suggestions and priorities of development and capacity buiding

Priority spheres for the NIP activities where it is necessary to strengthen the current potential and capabilities are:

1. Development of the normative and legal basis for realization of the RK obligations under the Stockholm Convention based on new "Law on Persistent Organic Pollutants" [Law on Chemical Safety].
2. Inclusion of the POPs inventory into the national statistic accountability system and state system of the environmental monitoring.
3. Development of the targeted long-term program on POPs elimination and reduction of the releases of unintentional POPs sources.
4. Feasibility study and realization of projects on POPs elimination; rehabilitaion of the territories

polluted by them and reduction of unintentional releases of POPs.

5. POPs monitoring.
6. Establishment of a chemical and analytical laboratory, oriented to the achivement of the tasks under the Stockholm Convention on POPs. In the country there is no accredited laboratory of the international level. During the implementation of the obligations of the country under the Convention the necessity of such a laboratory is urgent. Its creation is one of the most urgent tasks of the future.
7. Organization of a dioxin laboratory.
8. Establishment of the National Center on Persistent Organic Pollutants.

3.4. Schedule of introduction of the Plan and measures leading to success

Elimination of wastes containing persistent organic pollutants, reduction of POPs impact on human health and the quality of the environment in the Republic of Kazakhstan is the major objective of NIP.

The following tasks are planned to achieve the defined goal:

At the first stage of the NIP realization *(2010-2013)*:

- development of the normative legal basis in the sphere of POPs management;
- detailed inventory of POPs wastes and detailed evaluation of their unintentional releases;
- identification of the territories where POPs elimination is needed;
- development and realization of pilot projects on the rehabilitation of POPs polluted areas;
- proposals to the Secretariat of the Stockholm Convention on listing of new POPs of global significance, that are spread in Kazakhstan;
- public awareness raising on the POPs situation in Kazakhstan.

At the second stage of the NIP realization *(2014-2017):*

- ultimate elimination of pesticides waste except for the buried ones;
- introduction of best available purification techniques that reduce releases of dioxins and furans;
- development of a monitoring system for POPs within the USMS EP of RK.

At the third stage of the NIP realization *(2018-2028)*:

- elimination of burial grounds and newly revealed storages of obsolete and unwanted pesticides;
- ultimate elimination of industrial POPs;
- active POPs monitoring.

To track the NIP implementation progress the "Schedule of reports of the Republic of Kazakhstan in compliance with the requirements of the Stockholm Convention after its ratification by the Republic of Kazakhstan" is being developed (Table 20), the efficiency evaluation of implementation is being carried out (*Table 18*) and specific implementation indicators provided in the action plans are being monitored.