



International POPs Elimination Project

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

Evaluation of Potential Risks of Obsolete Pesticide Stockpiles for Human Health and the Environment

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About the International POPs Elimination Project

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

IPEP has three principal objectives:

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

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

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

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Introduction

Application of agricultural chemicals necessitates implementation of comprehensive scientific, methodological, organisational and technical measures in order to ensure their safe storage and reduction of their adverse health and environmental impacts.

Eco-Accord Centre initiated implementation of two projects in Chelyabinsk Oblast in the last two years ("The Time to Act" and "The Live Land"). These projects were associated with public participation in primary inventories of stockpiles of banned and obsolete agrochemicals. Pesticide stockpiles were identified and quantified, and the technical quality of pesticide storages was assessed.

The project participants concluded that, in the last 10 - 15 years, nobody addressed the problems of damaged pesticide storage facilities that represent point sources of environmental releases of these toxic compounds. Nobody assessed their potential and actual hazards for health and environment and nobody measured actual contamination levels of soils, water bodies and locally grown food products in close proximity to pesticide storage sites.

Recently, citizens initiated establishment of a joint inter-sectoral group. Members of the group studied the Methodological Recommendations for NGOs on Primary Inventories of Banned and Obsolete Pesticides and Agrochemicals, developed by Eco-Accord Centre (Moscow). The group incorporates representatives of NGOs, scientists, experts and educators. The idea of the project implementation was supported by socially active local residents of areas of the prospective survey.

Save and Protect

The "Save and Protect" project sought to promote public-initiated surveys for identification of potential and actual pesticide sources and associated environmental releases. Documented results of these surveys should be submitted to local executive bodies for development of comprehensive measures for prevention or reduction of adverse environmental effects of application of agricultural chemicals.

The project participants completed the following activities:

The analytical facility was selected for analysis of samples and the following objectives of the study were agreed:

- assessments of potential environmental hazards of damaged pesticide storage facilities, accounting for quantitative and qualitative parameters of the pesticides stored;
- assessment of actual soil contamination levels in areas, adjacent to pesticide storage facilities, assessment of damaged pesticide storage facilities as point sources of environmental releases;
- assessment of actual contamination levels of soils, water, bottom deposits in areas nearby pesticide storage facilities; assessment of nature, scales and levels of environmental pollution near pesticide storage facilities;

- identification of potential measures for soil reclamation and rehabilitation of other natural objects in pesticide-contaminated areas.

Condition of storage facilities

The following survey stages were completed:

Two field visits were organised for selection of sites to be surveyed. In the course of selection of the survey objects, members of the survey team accounted for locations of pesticide storages, potential areas of contaminated land, presence of residential and other buildings within potentially contaminated areas, proximity to water bodies, individual water wells, etc. Sites for the survey were mapped.

Quantitative and qualitative parameters of residual pesticides were assessed visually (about 1500 kg of pesticide mixtures were found in the destroyed storage facility in Rzavka village and about 3000 kg of a hazardous pesticide in Brodolkalmak village (the pesticide was stored separately), in addition, about 1500 kg of pesticide mixtures were found there).

According to local residents, all these storage facilities are located nearby residential houses and were constructed after the houses were already present (a serious violation). These former pesticide storage facilities are located near water sources, including the Verkhneuralskoye water reservoir (the source of drinking water of Magnitogorsk) and a pond in Brodolkalmak village, that is used for bathing and recreation by local residents, including children (the pond is located at a distance of 60 m from the damaged pesticide storage facility). The pond is located downhill from the storage and it was constructed after construction of the pesticide storage (another major violation). Local residents (1 Maya St.) said that, "In rainy weather, all the mud with chemicals from the storage drains into the pond". Individual water wells are operational in all houses, located near the storage facility. Water in these wells is muddy and has unpleasant odour. The community water well is located at a distance of 50 m from the storage. Water from the community well is used by local residents for household purposes. The community well does not meet applicable sanitary standards. The well site is covered by weeds and the well is not equipped with a lid and a bucket. As a result, according to a woman resident, "All use their own containers to take water. Usually people use buckets from trucks that are used by drivers for fuel or for truck washing and which are transported attached to a truck body. They use these dirty buckets to take water from the well"

The farming facility that operated the pesticide storage, ceased to exist long ago and the storage is now simply abandoned. In order to prevent entry of local residents to the storage, the Chief of the local administration made a large warning sign with word "Toxic!" there, but in vain, as nobody is frightened. As one local woman said, "We are used to all these warnings, as we lived nearby for too long".

In the course of the project implementation, two survey activities were completed:

1. A general examination and assessment of the site quality (Eco-Accord recommendations were used for these purposes, namely sections "Characterisation of a Pesticides/agrochemicals Storage Facility" and "Environmental Certificate of a Resource User")
2. Samples of environmental media were taken selectively in key points/directions and analysed.

Sampling protocol

Samples of soil and other samples were taken according to a State Standard (GOST):

1. Samples were taken from all sides of a surveyed site at 4 different depths (0 - 15 cm, 15 - 30 cm). Averaged samples were prepared for chemical analysis.

2. Agricultural lands, where pesticides were applied earlier (particularly vegetable fields still in use), were surveyed at the territory of Verkhneuralskiy district. In Brodokalmak village, a potato field of an individual farmer was studied. Soil samples at these fields were taken according to GOST - in 4 points of a field, along the field diagonal, soil for averaged samples was taken at depths of 0 - 15 cm and 15 - 30 cm.

3. Pesticide levels in water were estimated in a chemical laboratory. Water samples were taken according to a relevant methodology. Sampling points were selected in nearby water bodies, used for irrigation, recreation and household purposes: in Verkhneuralskoye water reservoir and in Brodokalmak village (see description of these water bodies above). Six samples were collected to produce two averaged samples. In Rzavka village, local residents use water from deep wells.

Bottom deposits were sampled in the pond in Brodokalmak village. Six samples were taken in different points to produce two averaged samples.

Chemical analysis was performed by "Chelyabinskiy" Centre of Chemicals Application and Agricultural Radiology Federal State Facility. The chemical analysis incorporated measurements of:

- organochlorine pesticides in water and soil (12 samples);
- organo-mercury compounds in soil (2 samples);
- organichlorine pesticides in water (2 samples).

Processing of analytical data helped provide the following information:

- nature of pesticide contamination (qualitative and quantitative information on pesticides);
- assessment of potential routes of pesticide releases to the environment;
- assessment of contamination-related risks for biota and pesticide impacts on quality of agricultural products;
- conclusions on necessity and nature of follow-up works.

After submission of the analytic results, the working group of the project developed recommendations for executive bodies on land reclamation and rehabilitation of other natural objects at territories surveyed, as well as recommendations for communities on control of their implementation.

Working group meeting

On August 3, after completion of the survey, the project participants initiated a working meeting, attended by representatives of the following organisations:

The Ministry of Radiation and Environmental Security (I.A. Gladkova, the Deputy Minister); the Ministry of Industry and Natural Resources (S.F. Mikhailov, a Department Chief); "Mayak" Production Association (A.N. Borisov, the Assistant Director on Public Relations). "Mayak" representatives were invited as many villages are located nearby the facility and "Mayak"

employees were expected to be concerned by safety and psychological state of local residents. These expectations were found to be true.

Degtyarev M.A., the Chief of Brodokalmak village Municipality.

Tyutikova T.M., a representative of Rzavka village municipality.

Zyuryanov S.G., a politology expert from the Centre of Analysis and Forecasts.

V.N. Kozlov, the Study Manager of the study of social problems of rural residents.

A.L. Gurman, the Director of Rural Municipalities.

V.N. Skvortsov, the Chairman of the Public Chamber of Chelyabinsk Oblast.

Public representatives: V.S. Zybalov, M.I. Pichkurov, M.Ya. Sobol, S.A. Stadnikov, V.F. Ozhogina and others.

The meeting participants discussed the issue of the urgent need to address the problem of removal of residual banned and obsolete pesticides from rural areas. Photos of pesticide storages were demonstrated. A proposal was made to apply Volgograd experience. In Volgograd, specialised military units repackaged and removed pesticides from local areas. The meeting participants recommended review of the proposal at the governmental level, as there are specialised military units at the territory of the oblast.

Results of Pesticide Measurements in Samples

Chemical analysis of soil, water and bottom sediments samples was made by "Chelyabinskiy" Centre of Chemicals Application and Agricultural Radiology Federal State Facility. Analytical results suggested the presence of organochlorine pesticides in soil, water and bottom sediments, as well as the presence of organo-mercury pesticides (ethyl mercury chloride).

Particularly high pesticide levels were found in samples taken at and near the site of the destroyed pesticide storage facility in the village of Brodokalmak (Krasnoarmeiskiy district). For example, in soil samples taken at the site at depths of 0 - 10 cm, levels of DDT and its metabolites reached 0.635 mg/kg. DDT metabolites (DDD and DDE) are even more toxic than the genuine pesticide itself.

High levels of DDT and its metabolites (0.62 mg/kg) were found in the averaged samples, taken at a distance of 10 m from the site of the former pesticide storage in Brodokalmak village at depths of 15 to 30 cm. In addition, HCCH was found in samples, taken at a distance of 30 m from the facility at the same depths (15 - 30 cm). These results suggest migration of these pesticides with rainwater and meltwater and their infiltration to soil depths over 30 cm. (See Protocols ## 2 and 4 of August 14, 2006.)

HCCH (0.03 mg/kg) was found in soil samples taken at a distance of 30 m from the site of the former pesticide storage at depths of 15 - 30 cm (0.03 mg/kg) and at depths of 0 - 15 cm (0.0062 mg/kg).

In addition, HCCH was found at a distance of 200 m from the site in soil samples, taken at a potato field of an individual farmer (0.014 mg/kg).

It seems likely that the latter pesticide continuously migrated through food chains in recent years (soil - agricultural products - human beings and soil - plants - animals - food products of animal origin). (See protocols ## 5, 6, 7 and 8 of August 14, 2006.)

Particularly high levels of DDT and its metabolites were found in soil samples taken at distances of 10 m to the South from the former pesticide storage facility (0.336 mg/kg). (See protocol # 9 of August 14, 2006.)

In addition, we studied local water bodies to estimate pesticide levels in water and bottom sediments.

For example, in the case of an operational individual water well, located at a distance of 70 m from the former storage site, HCCH was found in water (0.0056 mg/kg). In addition, in surface water located at a distance of 500 m from the site, HCCH reached a level of 0.0056 mg/kg. (See protocols ## 13 and 14 of August 14, 2006.)

In the averaged sample of bottom sediments collected in a surface water body, located at the opposite side of the site, DDT and its metabolites were found (0.06 mg/kg). (See protocol # 12 of August 14, 2006.)

Organo-mercury pesticides (ethyl mercury chloride) were identified at the site of the destroyed pesticide storage facility in Brodokalmak village (0.05 mg/kg at depths of 0 to 10 cm). (See protocol # 2 of August 14, 2006.)

A similar situation was observed at the territory of Agapovskiy district, nearby Magnitogorsk. DDT levels of 0.09 mg/kg were found in soil samples taken at depths of 0 to 20 cm and 0.047 mg/kg at a distance of 10 m from the destroyed storage of the Central Farm of the former Dairy and Vegetable Production Facility of Magnitogorsk Metallurgy Plant, that is located at an elevation (the southern part) and at a plain ground (the northern part). (See protocols ## 10 and 11 of August 14, 2006 (the southern elevation))

At the plain ground (the northern part) at distances of 10 to 15 m and at the central site, HCCH, DDT and its metabolites were not found in samples, taken at depths of 0 to 15 cm. (See protocols ## 1 and 3 of August 14, 2006.)

Results and discussion

Thus, results of selective chemical analysis of samples, collected at two sites in Agapovskiy and Krasnoarmeiskiy districts, confirmed the presence of organochlorine and organo-mercury pesticides that were banned for production and have not been applied in agriculture for 20 years. These pesticides pose major health and environmental hazards.

Our studies allow us to assume that a similar situation might be observed in the other 24 rural areas, where destroyed and abandoned pesticide storages are located.

The study results suggest that the problem of utilisation of banned and obsolete pesticides is fairly relevant for the oblast. Oblast-level programs of environmental improvement stipulate that measures for utilisation and final disposal of such pesticides will be implemented in the course of the next five years. However, the situation should be addressed immediately.

There is another important issue as well: introduction of the methodology for assessment of the health risks to local residents recognised by developed countries. Application of the methodology would help document the health status of local residents and identify routes of human intake of hazardous chemicals. In other words, the methodology would allow the design of more adequate environmental improvement plans for territories where problems of safety of local residents have

not been addressed for 20 years and where storage facilities containing banned and obsolete pesticides are located.

Recommendations

1. To continue studies of toxic pesticides in the territories of Chelyabinsk Oblast, where destroyed and abandoned pesticide storage facilities are located.
2. To conduct research studies for identification of routes of human pesticide intake through food chains (soil - agricultural products - human beings and soil - plants - animals - food products of animal origin) at territories, where damaged and abandoned pesticide storages are located. Implementation of such research studies would provide scientific insight into the situation, and help identify routes of human pesticide intake for development and implementation of comprehensive measures to enhance the health status of local residents, including children as a particularly vulnerable group.

Results of such research studies might be used for identification of priority territories for implementation of actions for repackaging and removal of pesticides for safe storage in order to ensure environmental well-being of local residents.

3. To conduct selective health and environment studies to assess health impacts of pesticides on rural residents in territories where pesticide storage facilities are located near residential houses, water bodies or private gardens; to assess environmental risks to the health of local residents.

Results of such research studies may be used for development of health and environment improvement programs.

4. To submit results of these research studies to governmental/local authorities as background materials for development of comprehensive measures for elimination of pollution sources and area reclamation purposes.
5. To support the public initiative on a seminar with involvement of rural municipal authorities on organisational, legal and informational activities for addressing the problem of banned and obsolete pesticides.
6. To conduct a theoretical and practical conference for agricultural specialists on soil fertility enhancement. The conference participants should discuss issues of toxic pesticides, located in the territory of Chelyabinsk Oblast.