Toxic Site Identification Program in Kyrgyzstan

Award: DCI-ENV/2015/371157

Prepared by: Indira Zhakipova, Alena Temnikova, Petr Sharov, Julia Sinitsky

Prepared for: UNIDO

Date: November 2018

TABLE OF CONTENTS

Pure Earth 475 Riverside Drive, Suite 860 New York, NY, USA +1 212 647 8330 www.pureearth.org

`

ACKNOWLEDGEMENTS

This activities described in this report were supported by the European Commission and the United Nations Industrial Development Organization project "Mitigating Toxic Health Exposures in Low-and Middle-Income Countries: Global Alliance on Health and Pollution" (DCI-ENV/2015/371157).

ORGANIZATIONAL BACKGROUND

Pure Earth/ Blacksmith Institute (PE/BI) is an international non-profit organization dedicated to solving pollution problems in low- and middle-income countries. Since 2009 Pure Earth has been implementing the Toxic Sites Identification Program (TSIP), which is an effort to identify and screen contaminated sites in low- and middle-income countries where public health is at risk. TSIP has been supported by The United Nations Industrial Development Organization (UNIDO), United States Agency for International Development (USAID), European Commission, Asian Development Bank (ADB), World Bank and Green Cross Switzerland. The contaminated sites are identified by trained consultants/investigators drawn from universities in respective countries, and use the Initial Site Screening (ISS) protocol to identify contaminated sites. The ISS helps stakeholders, NGOs and local and country governments to understand the risks posed by pollution. In addition to this, the program allows for a deep understanding within countries of the scope of the problem. It allows governments and stakeholders to see the types of pollutants, size of polluted sites, population at risk at each site, the magnitude of health risk posed to communities, and possible remediation solutions.

PROJECT BACKGROUND

The Toxic Sites Identification Program (TSIP) is designed to identify contaminated sites all over the world and to assess their potential impact on human health. To the date over 4600 sites in 99 countries have already been identified and downloaded into the database.

Pure Earth 475 Riverside Drive, Suite 860 New York, NY, USA +1 212 647 8330 www.pureearth.org

`

This is probably only a small part of all contaminated sites in the world. Therefore it is very important to continue studying toxic pollution and its impact on health. Specifically trained investigators work for Pure Earth/Blacksmith Institute in low- and middle income countries using the Initial Site Screening (ISS protocol) to implement this task.

A special program developed by Pure Earth/ Blacksmith Institute called the ISS protocol helps stakeholders and governments to understand the risks associated with contamination, to identify types of contaminates, to estimate the size of contaminated area, to count the number of people at risk, and to develop a preliminary plan for rehabilitation and clean-up of sites.

The main result of this work is creating an exhaustive list of toxic sites that pose a risk to human health in each country.

Toxic Site Identification Program (TSIP)

The Toxic Sites Identification Program aims to assess sites that have Toxic Pollution:

- From a "point-source" (a fixed location, not air pollution from cars and trucks)
- In concentrations or levels that can cause adverse human health impacts
- Where there is a migration route and exposure pathway to humans
- In low- and middle-income countries as designated by the World Bank

The program focuses specifically on legacy sites (i.e. abandoned or non-active) and artisanal sites (i.e. small-scale or informal industries).

Central to Pure Earth's approach is the model of Pollution-Migration-Pathway-People as the basis for understanding and assessing risks at a particular site. This model is consistent with risk screening approaches used internationally (by U.S. EPA, WHO and others) but is simplified for the purpose of conducting rapid risk screenings.

Pure Earth is focused on people's health. However, many health impacts from pollution are chronic and are difficult to attribute directly to one source. In the context of an Initial Site Screening (ISS) it is unusual to be able to demonstrate clearly the health consequences of a

Pure Earth 475 Riverside Drive, Suite 860 New York, NY, USA +1 212 647 8330 www.pureearth.org

`

particular site. What can be done is to show that there is a credible risk attached to the site and that this risk deserves further investigation, as part of the design of an intervention.

In simple terms, the health impact of a compound on an individual is a function of its toxicity and the dose received by people. The dose is a function of the concentration of the toxic compound, the time that people are exposed, and the pathway into the body. There are three basic pathways: inhalation – entry into the body through breathing; ingestion – entry through eating or drinking; and dermal – entry through skin contact and absorption.

The existence of a public health risk at a site depends on three components:
1) There must be a source of pollution with a severe enough toxicity and a high enough level or concentration to be hazardous;
2) There must be a migration route for the pollution get to an area used or occupied by people; and
3) There must be a pathway into the body whereby people have the contaminant in their bodies for a long enough time for a significant dose to occur.
The ISS is the process by which these components are identified and assessed at a site.

TSIP Training in Kyrgyzstan

In April 2012, the first training workshop on the site assessment methodology using the Initital Site Screening (ISS) protocol was held. At the training, Pure Earth's Regional Director for Eastern Europe and Central Asia, drew MacCartor and Regional Coordinator Petr Sharov taught about the TSIP protocol and the organization's work in Kyrgyzstan. He also demonstrated the methodology for assessing contaminated sites, developed by Pure Earth/ Blacksmith Institute. The workshop was attended by 5 specialists in the field of environmental protection, and geology. Petr Sharov trained researchers in the method for assessing contaminated sites. Researchers gained access to the TSIP database and practiced filling it out with site information. All trained researchers have worked and continue to work on the assessment of contaminated sites in different regions of Kyrgyzstan

In total since 2012 in Kyrgyzstan 47 sites contaminated with toxic substances have been identified. It was estimated that there are 100,846 people whose health is at risk living or working at or near those sites. The main sources of toxic substances are mining enterprises and storage facilities for obsolete pesticides.

COUNTRY BACKGROUND

In Kyrgyzstan, tailing dumps from the Soviet era and modern mining are located in the mountains and foothill zones, in urban areas, and in seismically dangerous mountainous areas that are at risk of landslides. Waste from the mining industry containing no toxic chemicals was stored and continues to be stored at the mining site in tailings and dumps.

There are a number of issues related to environmental pollution and its impact on human health in Kyrgyzstan. In the early 2000s there were over 680 million cubic meters of dumps (mechanically fractured rocks) in the country. These dumps occupied an area of 1500 hectares. The dumps contain heavy metal compounds and other toxic substances which were used to extract valuable components from ore (such as cyanides, various acids, sulfates, nitrates, etc.). The serious danger of these above-ground waste disposals is that their negative impact continues for a long time after the closing of the mine. For example, the analysis of contamination of the groundwater near the tailings of the Kara-Balta Mining Facility in Kyrgyzstan indicates that the area of groundwater contamination increased. Currently the contamination has spread to 15 km from the tailing to the city (Salyev, 2017).

The greatest threat to human health and the environment is the disposed waste from uranium mining, which is located in the northern and southern regions of Kyrgyzstan. All uranium mines in Kyrgyzstan were closed at the end of the 1960s, but a large amount of environmentally hazardous waste remains in the republic. This waste is mainly located along rivers and in the foothills and mountain areas. At present, most of the tailings and dumps in the republic are in not looked after, are exposed to water and wind erosion, are located in zones which have a high risk of seismic activity, and are prone to landslide and mudslides. In the event that a weather or seismic event occurs—the likelihood of which is high, large areas of land in the valleys and near population centers, as well as the lowland territories will be contaminated with hazardous chemicals including radioactive elements. Territories of the Kyrgyz Republic, the Republic of Kazakhstan, the Republic of Tajikistan and the Republic of Uzbekistan, where about 5 million people live, are under high risk of possible contamination. (Dzhenbaev, Mursaliyev, 2012; Problem of the mining industry ..., 2012; Torgoyev, Aleshin, 2009).

According to preliminary estimates, over 60 thousand people live in areas with a moderate environmental risk in Kyrgyzstan, and about 80 thousand people live in an area with a high environmental risk. (Salyev, 2017).

To determine the number of people at risk from toxic pollutants, as well as their locations, Pure Earth has been working to identify and evaluate toxic sites in Kyrgyzstan since 2007. To date, researchers have already evaluated and described 47 toxic sites located in different regions of the country. A rapid assessment method (often with the use of an XRF), as well as methods of laboratory analysis were used to assess contaminated sites. Trained researchers who are specialists in the field of ecology and environmental protection have used Pure Earth's Toxic Site Identification Program (TSIP) protocol to record and evaluate risk at sites. In Kyrgyzstan, the main industries that pollute the environment at the surveyed sites are mining and its legacy waste in the form of dumps and tailings. In addition to this, Kyrgyzstan has a number of run down and dilapidated storage facilities for obsolete pesticides. The following types of key pollutants were identified during TSIP sampling in Kyrgyzstan: pesticides (DDT and its derivatives, HCH, lindane), toxic elements (lead, arsenic, antimony, mercury), and radioactive contaminants caused by uranium and thorium mining activity. The total population at risk from environmental pollutants is estimated to be 100,846 people.

IMPLEMENTATION AND WORKING WITH THE GOVERNMENT/NGOS

Public Association Ekois-Bishkek

In Kyrgyzstan, Pure Earth's partner is the Public Association Ecois-Bishkek. This organization is the successor of the Public Fund Ekois which was founded in 2008 and closed in 2013. Indira Zhakipova, the coordinator for Pure Earth in Kyrgyzstan works at Ekois-Bishkek.

The main areas of focus for Ekois-Bishkek are: POPs, toxic contamination, public participation, capacity building of public officials and ecoNGOs, extending access to environmental information, Chemical Safety, Eco - education

Target group(s): Environmental NGOs, State authorities, international organizations, Media Membership in specialized associations: IPEN (2010), Kyrgyz Climate net (Климатическая сеть Кыргызстана), IHPA (2009), Mountain Partnership (2012)

Ekois is a widely known organization in the Central Asia, and is one of the main environmental news service **www.ekois.net.** Ekois has more than 1500 subscribers on the newsletters (digest-novosti) from EECCA region. The average amounts of site visitors are 400-500 persons per day. Activities undertaken range from extending access to environmental information, to public participation, to capacity building and trainings of environmental NGOs, state officials, private sector institutions, and international organizations.

Ekois-Bishkek works on the national level with multip0le Ministries, including State Agencies and local authorities in the provinces. Ekois-Bishkek is a key organization for FAO's EC- and GEF-funded projects in Central Asia on obsolete pesticides and has been a task manager for national inventories of obsolete pesticides stocks and a landfills, for risk assessment, for development of the EAs and related EMPs, and is knowledgeable on local environmental laws.

In Kyrgyzstan, Ekois-Bishkek closely cooperates with the Ministry of Emergency Situations, the State Agency of Environment Protection and Forestry (SAEPF), and the Ministry of Health. Ekois-Bishkek is also a member of Interministerial Coordinating Commission (ICC) on Safe Management of Chemicals chaired by the Vice-Prime Minister. The ICC was set up in order to ensure safe management of chemicals; better coordination of donor assistance; and more effective cooperation between state agencies, non-governmental organizations and the private sector.

Ekois-Bishkek has an office in Bishkek, which can hold working group meetings and expert consultations.

Current NGO or Civil Society Partners who have committed communications resources to amplify and share the main messages about the health risks of pollution or have been trained on the issues of toxic pollution and its relevance to their constituencies
Local CSO Contacts: Independent ecological expertise NGO**,** Yrystan NGO**,** Talas University**,** Naryn University**,** Kyzyl-Kiya College **,** Global Poverty Project, Human Rights Watch**,** Environmental Defense Fund**,** World Resources Institute/Access Initiative**,** Global Alliance for Clean Cookstoves**,** Clean Air Asia, Médecins sans Frontières (MSF).

SITES SURVEYED IN 2016

In 2016, a total of 5 sites were assessed. Two sites (Naiman Village and Sovetskoe) were assessed in detail. The sample information and detailed descriptions are outlined below.

Sites Surveyed in 2016

Kg-4527 - Naiman Village, Nookatsky District (Detailed site assessment)

Naiman Village is situated in Nookatsky District in Osh Region. About ten to thirteen kilometers to the north-east of the village of Naiman there is a mercury-antimony deposit of Chonkoy and the Uluu-Too mine. The Chonkoy deposit contains 6 thousand tons of mercury reserves. The mine, which belonged to the Khaidarkan mercury plant, was developed by underground method from 1963 to 1994. The enterprise employed 600-700 people, mainly residents of the settlement Naiman and the city of Kyzyl-Kiya. During the years of the mine's top productivity, Naiman's population was roughly doubled today's population at 3500 people. In September 1995, the enterprise was closed due to the absence of government subsidies, the departure of skilled labor and the and the falling prices in the metals market. This resulted in the departure of many villagers who searched for employment elsewhere. In 1998, the remaining assets of the plant were transferred to private ownership, and further processing of mercury-containing wastes was continued for several months, but then this activity ceased. As of today, the property of the former enterprise has been almost completely destroyed. All of the company's main assets have been demolished, sold, or plundered by the local population. The closure of the plant was not accompanied by cleaning and rehabilitation of the site.

While it was operational, the mine infrastructure included power transmission lines and water pipes, underground mines, a concentrating mill, a metallurgical plant, a tailings pond and slag piles. In other words, the company created a full-cycle of mercury production. A limited amount of information on the environmental aspects of the mine is included in the environmental passport of the Khaidarkan mercury plant (1990). During operation, energy consumption of the enterprise was approximately 15 million kWh, water consumption - 2 million cubic meters. Emissions of mercury into the atmosphere from metallurgical production reached 2.2 tons / year; but according to other sources - 0.8 tons per year.

Currently, the slag dumps occupy an area of 10 hectares (the height of the dumps in some places reaches 5-20 m, the amount of slag is estimated at 2 million tons), and the tailing pond - 4 hectares. The equipment of the concentrator and the metallurgical plant was completely dismantled, only concrete and large metal structures (for example, drum furnaces) remained on the site. The mercury content in the surface layer of the slag dumps (depth 20-30 cm) is about 26-28 ppm, and concentrations in the tailings and sections of the pipeline reach 120-720 ppm. The slag-pits and tailings are not fenced and do not have warning signs. The local population and livestock can freely enter this territory. Agriculture is limited to small plots. Water supply is carried out through a water pipe from a remote source (the river Abshir).

The main sources of contamination of the Naiman village are the products that were wastes from antimony and mercury production. The inhabitants of the village had no idea of the harm and danger of the mining enterprise on which they worked.
According to local residents, plant workers brought home elemental mercury from the factory hoping to sell it, but later finding no use for it, disposed of it, not near the tailings pond, but right in the irrigation channels of the village, where mercury settled on the bottom of the irrigation ditch, and caused pollution of vast areas.
Water from the irrigation channel enters the gardens of local residents. Water from this irrigation channel is also fed to livestock. The children and the villagers bathe in it. According to the inhabitants, you can find many places in the village where the workers have poured elemental mercury.

From the testimony of former plant worker Ikram Kazakov, it also became apparent that mercury in the irrigation ditches was not only there because of irresponsible dumping by local residents but also because the large diameter pipes used inside the irrigation ditches were previously used at the plant as radiators for mercury cooling. As a result, part of the mercury settled on the walls of the pipes and remained there. When using pipes, mercury was gradually washed off from the walls and outward, settling at the bottom of the irrigation channel.

In addition, another source of contamination is the equipment for the enrichment of the mercury deposit, which was left at the perimeters of the plant. Because of this, an area outside the plant has been contaminated by mercury waste. The full scale of the contamination's dispersal is still not clear. Now the people who worked at the mine are mostly engaged in agriculture and not in mining, but the pollution likely has an effect on their health and work.

In 2015 samples of soil from irrigation channel were taken. The results of the analyses showed a significant excess of the soil screening levels (SSL) of elemental mercury which is extremely dangerous for human health. The concentration of mercury in the sediments of the irrigation channel is 20 -287.5 mg/kg (1.8 – 26 SSL). Water from the irrigation ditch entered the vegetable gardens of local residents. Children were observed playing near the channel or even digging out metallic mercury and playing with it. Investigators from Pure Earth measured the concentrations of Hg using an XRF. The concentrations Hg in soil were higher than 1300 ppm. The toxic effect of mercury, especially expressed in chronic poisoning, is primarily associated with the damage to the nervous system, mucous membranes of the respiratory tract and digestive tract.


Fig. 1. Measurement of mercury concentrations using XRF

`

Fig. 2. Pure mercury

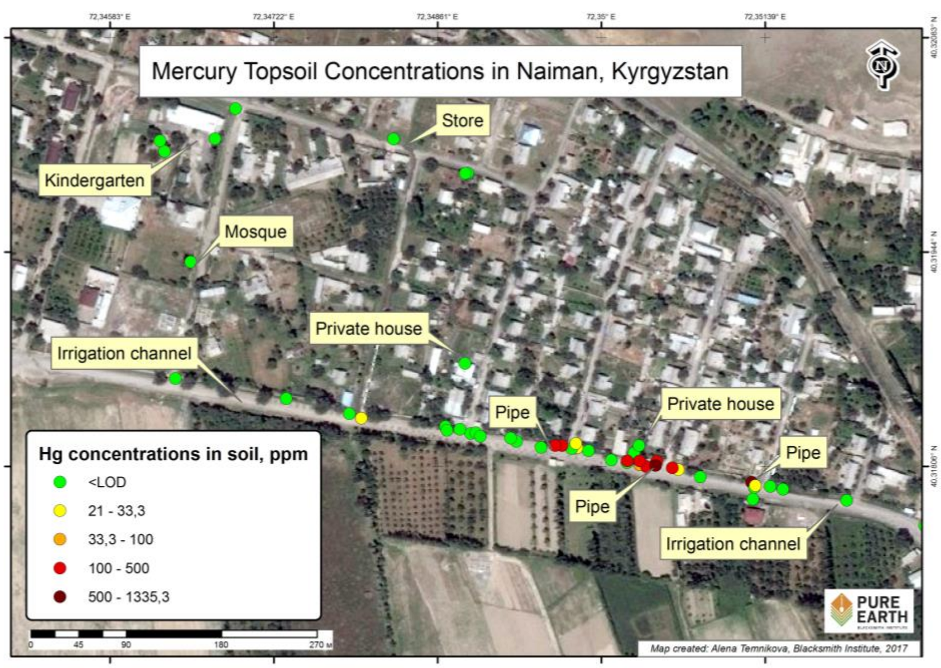

Fig. 3. Map of the site with sampling points

Table 1. Concentrations of contaminants (Naiman Village, Nookatsky District)

Longtitude	Latitude	Date	Sand/ soil/ sediment	Description of the sampling spot	Pop.	Hg, ppm	As, ppm	Pb, ppm
72,3484	40,31834	14.10.2015	soil	near the road	40	19,3	-	-
72,35007	40,31813	14.10.2015	soil	near the private house	40	84,3	-	-
72,35043	40,31806	14.10.2015	soil	near the channel	30	287,5	-	-
72,35047	40,31809	30.10.2017	soil	irrigation channel	10	<LOD	<LOD	24,62
72,35047	40,31809	30.10.2017	pipe	irrigation channel	40	404,17	44,28	<LOD
72,35047	40,31809	30.10.2017	pipe	irrigation channel	10	311,44	18,44	<LOD
72,35033	40,31807	30.10.2017	soil	irrigation channel	10	34,55	25,01	25,41
72,35038	40,31805	30.10.2017	soil	irrigation channel	10	139,98	15,78	26,46
72,35022	40,31808	30.10.2017	soil	irrigation channel	10	<LOD	<LOD	30,36
72,35008	40,3181	30.10.2017	soil	irrigation channel	10	<LOD	21,77	30,3
72,35008	40,3181	30.10.2017	soil	road	10	<LOD	<LOD	27,24
72,35027	40,31814	30.10.2017	soil	private house	10	<LOD	21,17	<LOD
72,35032	40,31819	30.10.2017	soil	private house	10	<LOD	16,83	22,01
72,35979	40,31818	30.10.2017	soil	irrigation channel	10	24,63	<LOD	28,73
72,35971	40,3182	30.10.2017	soil	irrigation channel	10	56,5	16,36	33
72,35971	40,3182	30.10.2017	soil	irrigation channel	10	33,19	<LOD	42,69
72,34966	40,31819	30.10.2017	soil	irrigation channel	10	<LOD	22,65	33,69
72,34966	40,31819	30.10.2017	pipe	irrigation channel	10	<LOD	<LOD	33,66
72,34966	40,31819	30.10.2017	pipe	irrigation channel	10	214,49	62,44	62,31
72,34927	40,31822	30.10.2017	soil	irrigation channel	10	<LOD	<LOD	23,34
72,34927	40,31822	30.10.2017	soil	irrigation channel	10	<LOD	<LOD	30,04
72,34927	40,31827	30.10.2017	soil	irrigation channel	10	<LOD	17,84	<LOD
72,34927	40,31827	30.10.2017	pipe	irrigation channel	10	<LOD	89,28	63,7
72,34889	40,31872	30.10.2017	pipe	private house	10	<LOD	42,75	<LOD
72,34889	40,31872	30.10.2017	soil	irrigation channel	10	<LOD	<LOD	<LOD
72,34889	40,31872	30.10.2017	soil	irrigation channel	10	<LOD	<LOD	<LOD
72,34884	40,31829	30.10.2017	soil	irrigation channel	10	<LOD	102,15	48,09
72,3488	40,31829	30.10.2017	pipe	irrigation channel	10	<LOD	115,94	<LOD
72,34868	40,31831	30.10.2017	pipe	irrigation channel	10	<LOD	<LOD	18,8
72,34868	40,31831	30.10.2017	soil	irrigation channel	10	<LOD	26,03	22,58
72,34869	40,31829	30.10.2017	soil	irrigation channel	10	<LOD	<LOD	42,21
72,34796	40,31837	30.10.2017	soil	irrigation channel	10	40,32	27,89	16,5
72,34796	40,31837	30.10.2017	soil	irrigation channel	10	<LOD	28,95	20,52
72,34796	40,31837	30.10.2017	soil	irrigation channel	10	22,92	15,41	29,12
72,34796	40,31837	30.10.2017	soil	irrigation channel	10	<LOD	18,88	24,6
72,34786	40,3184	30.10.2017	soil	irrigation channel	10	<LOD	<LOD	<LOD
72,34786	40,3184	30.10.2017	pipe	irrigation channel	10	<LOD	96,63	<LOD
72,34786	40,3184	30.10.2017	pipe	irrigation channel	10	<LOD	<LOD	36,78
72,34733	40,3185	30.10.2017	soil	irrigation channel	10	<LOD	20,61	<LOD
72,34639	40,31863	30.10.2017	soil	irrigation channel	10	<LOD	<LOD	<LOD
72,34651	40,31938	30.10.2017	soil	mosque	10	<LOD	13,87	23,27
72,34673	40,32018	30.10.2017	soil	kindergarten	10	<LOD	<LOD	41,77
72,34629	40,3201	30.10.2017	soil	kindergarten	10	<LOD	18,86	37,35
72,34626	40,32016	30.10.2017	soil	kindergarten	10	<LOD	<LOD	41,26
72,34689	40,32037	30.10.2017	soil	2-nd street	10	<LOD	22,52	22,23

72,34824	40,32018	30.10.2017	soil	store	10	<LOD	<LOD	25,27
72,34887	40,31996	30.10.2017	soil	irrigation channel	10	<LOD	<LOD	24,31
72,34885	40,31995	30.10.2017	pipe	irrigation channel	10	<LOD	108,82	<LOD
72,34985	40,32057	30.10.2017	soil	channel	10	<LOD	28,65	82,23
72,34894	40,31827	30.10.2017	soil	irrigation channel	10	<LOD	20,03	<LOD
72,34897	40,31825	30.10.2017	soil	irrigation channel	10	<LOD	20,31	28,68
72,34923	40,31824	30.10.2017	soil	irrigation channel	10	<LOD	<LOD	22,15
72,34949	40,31818	30.10.2017	soil	irrigation channel	10	<LOD	<LOD	32,91
72,34961	40,31819	30.10.2017	soil	irrigation channel	10	32,12	23,09	35,15
72,34961	40,31819	30.10.2017	soil	irrigation channel	10	<LOD	<LOD	70,57
72,34961	40,31819	30.10.2017	pipe	irrigation channel	10	168,52	65,43	55,06
72,34975	40,31818	30.10.2017	pipe	irrigation channel	10	<LOD	22,33	24,6
72,34975	40,31818	30.10.2017	soil	irrigation channel	10	<LOD	14,67	21,2
72,34975	40,31818	30.10.2017	pipe	irrigation channel	10	<LOD	<LOD	67,39
72,34989	40,31816	30.10.2017	soil	irrigation channel	10	<LOD	15,81	30,95
72,35022	40,31809	30.10.2017	soil	irrigation channel	10	36,58	15,47	33,59
72,35033	40,31809	30.10.2017	soil	irrigation channel	40	108,25	<LOD	31,97
72,35046	40,31806	30.10.2017	soil	irrigation channel	40	479,61	<LOD	<LOD
72,35046	40,31806	30.10.2017	soil	irrigation channel	40	900,88	<LOD	26,24
72,35046	40,31806	30.10.2017	soil	irrigation channel	40	750,37	<LOD	22,61
72,3506	40,31805	30.10.2017	soil	irrigation channel	10	126,59	21,49	28,25
72,3506	40,31805	30.10.2017	pipe	irrigation channel	10	52,05	41,52	28,14
72,3506	40,31805	30.10.2017	pipe	irrigation channel	40	488,71	39,47	54,5
72,35065	40,31804	30.10.2017	soil	irrigation channel	10	22,26	<LOD	50,09
72,35084	40,31799	30.10.2017	soil	irrigation channel	10	<LOD	17,89	28,67
72,35127	40,31795	30.10.2017	soil	irrigation channel	40	1335,3	<LOD	95,83
72,3513	40,31792	30.10.2017	soil	irrigation channel	10	20,84	<LOD	19,67
72,3513	40,31793	30.10.2017	soil	irrigation channel	10	22,92	34,62	16,84
72,3513	40,31784	30.10.2017	soil	irrigation channel	10	<LOD	13,09	19,74
72,35143	40,31792	30.10.2017	soil	irrigation channel	10	<LOD	<LOD	15,72
72,35143	40,31792	30.10.2017	soil	irrigation channel	10	<LOD	<LOD	35,34
72,35153	40,31791	30.10.2017	soil	irrigation channel	10	<LOD	22,11	21,03
72,35207	40,31783	30.10.2017	soil	irrigation channel	10	<LOD	19,41	17,61
72,35207	40,31783	30.10.2017	pipe	irrigation channel	10	<LOD	45,61	<LOD
72,35274	40,31767	30.10.2017	soil	irrigation channel	10	<LOD	29,72	16,13
72,3548	40,31713	30.10.2017	soil	irrigation channel	10	<LOD	19,32	<LOD
72,35471	40,31674	30.10.2017	soil	irrigation channel	10	<LOD	13,59	22,37

Kg-4619 - Kara-Balta

In the city of Kara-Balta houses a plant, which during the Soviet era processed uranium and other ores. There is a tailings pond near the plant. It is located in the southern part of the city of Kara-Balta, near the side of the mountains, directly near the village.

The major industry in Kara-Balta was the processing plant of the Kara-Balta Ore Mining Combine (KBMP), the largest in Central Asia. During the Soviet era, it processed uranium ore from deposits in Kyrgyzstan and Kazakhstan. After independence, the mines in Kyrgyzstan closed quickly; however, KBMP has continued to process uranium concentrate from Kazakhstan until 2005 when this activity was stopped due to the lack of raw material. The massive uranium tailings remain a problem. KBMP still processes gold and molybdenum ores.

Fig. 4. View of the tailings

`

Fig. 5. Measurement concentrations of toxic elements

Table 2. Concentrations of contaminants (Kara-Balta)

Longtitude	Latitude	Date	Sand/ soil/ sediment	Description of the sampling spot	Population	As, ppm	Pb, ppm
73.50182	42.47847	05.06.2016	soil	Sourth part of the town	300	21	34
73.50892	42.46382	05.06.2016	soil	South-east part of KBMP, field	150	-	35
73.49996	42.46718	05.06.2016	soil	Western part of KBMP,along the road	50	-	24
73.50311	42.46975	05.06.2016	soil	Northen part of KBMP,along the road	50	-	32
73.50506	42.46935	05.06.2016	soil	Northen-east part of KBMP,along the road	50	-	88
73.50201	42.47385	05.06.2016	soil	Northern part of tailings	50	-	28

73.50099	42.47633	05.06.2016	soil	Northern part of tailings near the town	50	15	16
73.50055	42.47801	05.06.2016	soil	Sourth part of the town	100	-	38
73.50010	42.47922	05.06.2016	soil	Sourth part of the town	100	-	84
73.50208	42.46168	05.06.2016	soil	South part of KBMP, field	200		22

Kg-4837 - Terek-Say mining (Antimony)

The settlement of Terek-Sai is administratively located in the Chatkal district of the Jalal-Abad oblast of the Kyrgyz Republic. It is located on the southern slope of the Chatkal ridge. The nearest large settlement to the deposit is the Ala-Buka district center (45 km). The Terek-Sai mine has been developing gold-bearing antimony since the 1950s, the antimonite concentrate from which were processed at the Kadamjai Metallurgical Combine. All this time the Terek-Sai mine was part of the Kadamjai antimony plant. Currently, the mine belongs to a Turkish company.

As a result of prolonged exploitation of antimony deposits, millions of tons of solid waste in the form of waste rock, slag, cinder, slurry tailings and flotation have accumulated on the territory of the village. These waste contain hundreds of thousands of tons of compounds of mercury and antimony, arsenic, heavy metal compounds and other toxic elements. Because of wind, dust from the dumps spreads to the nearest pastures, and also to the residential area. All wastes are washed from the waste tank by rains and the upper layer is washed off and eventually collected in the riverbed.

The investigated site is located 360 km from the regional center of the city of Jalalabad. The village of Turk-Say is located on the southern slope of the Chatkals Ridge (1500-1900 above sea level).

From the surface of mountain dumps and cinders, polluted dust is transferred by wind and water. The population uses contaminated sand as building material. This leads to adverse health effects.

Fig. 6. View of the village

Fig. 7. A person is going to use toxic sand from the tailings for construction purpose

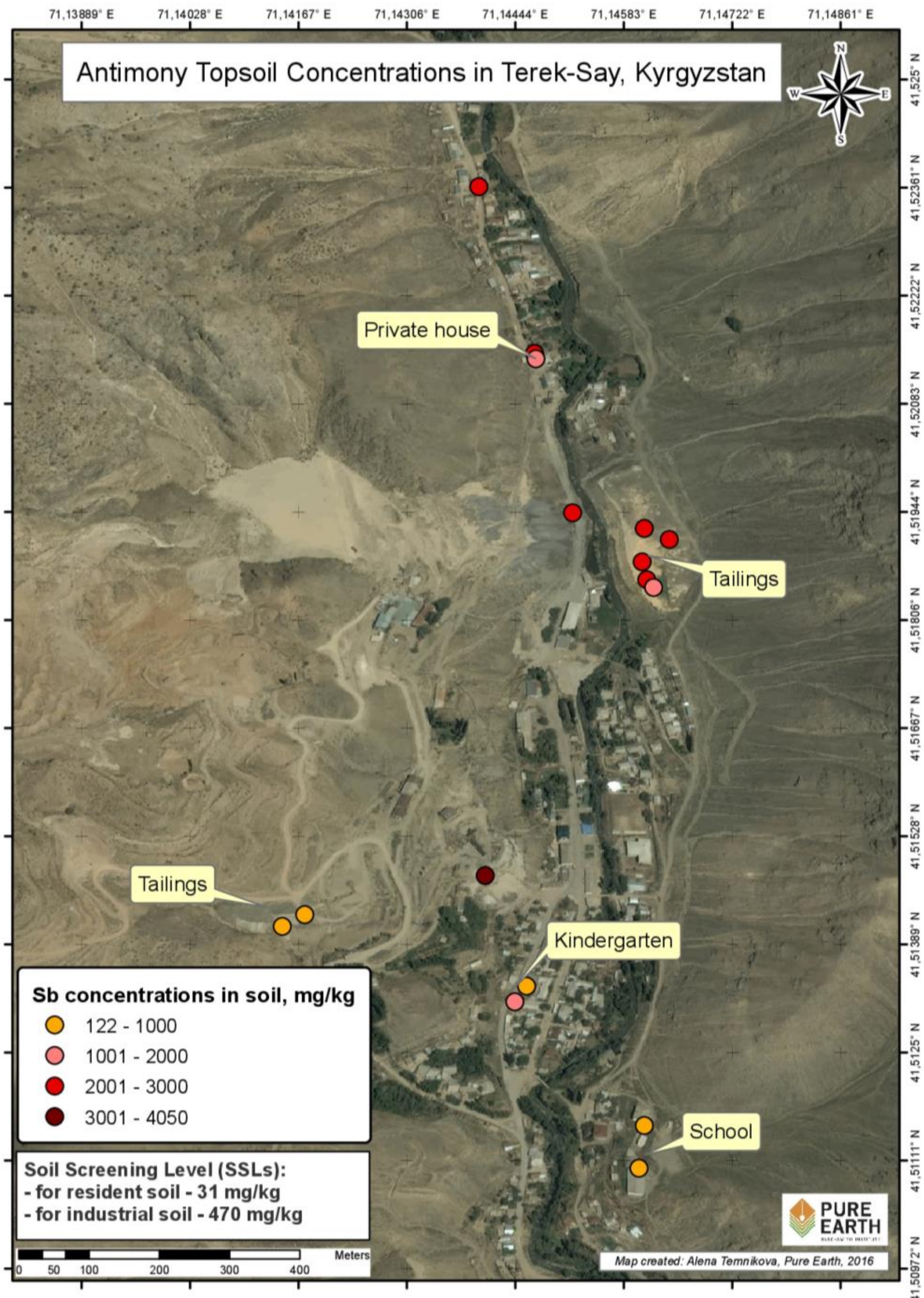

Fig. 8. Map of the site with sampling points

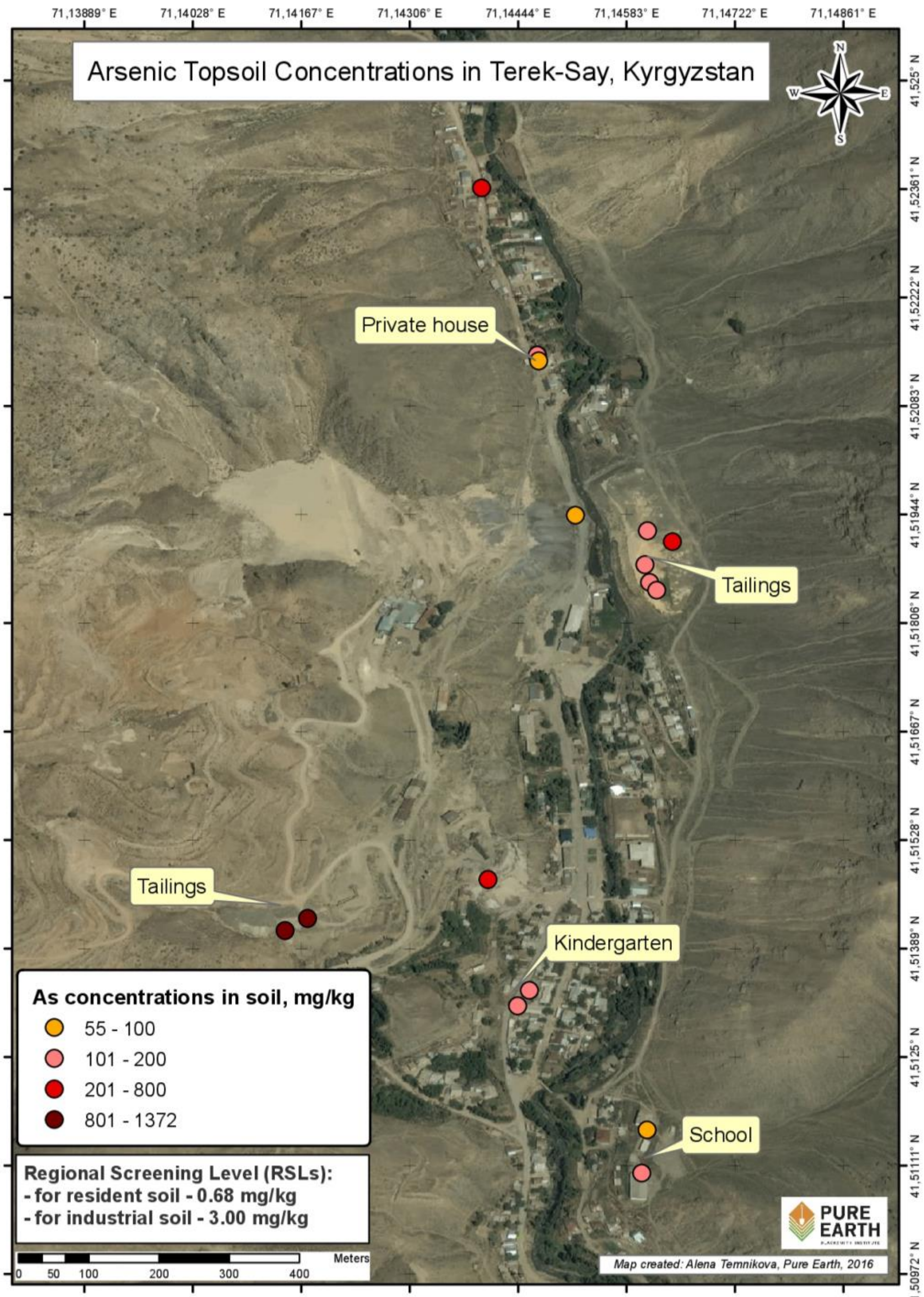

Fig. 9. Map of the site with sampling points

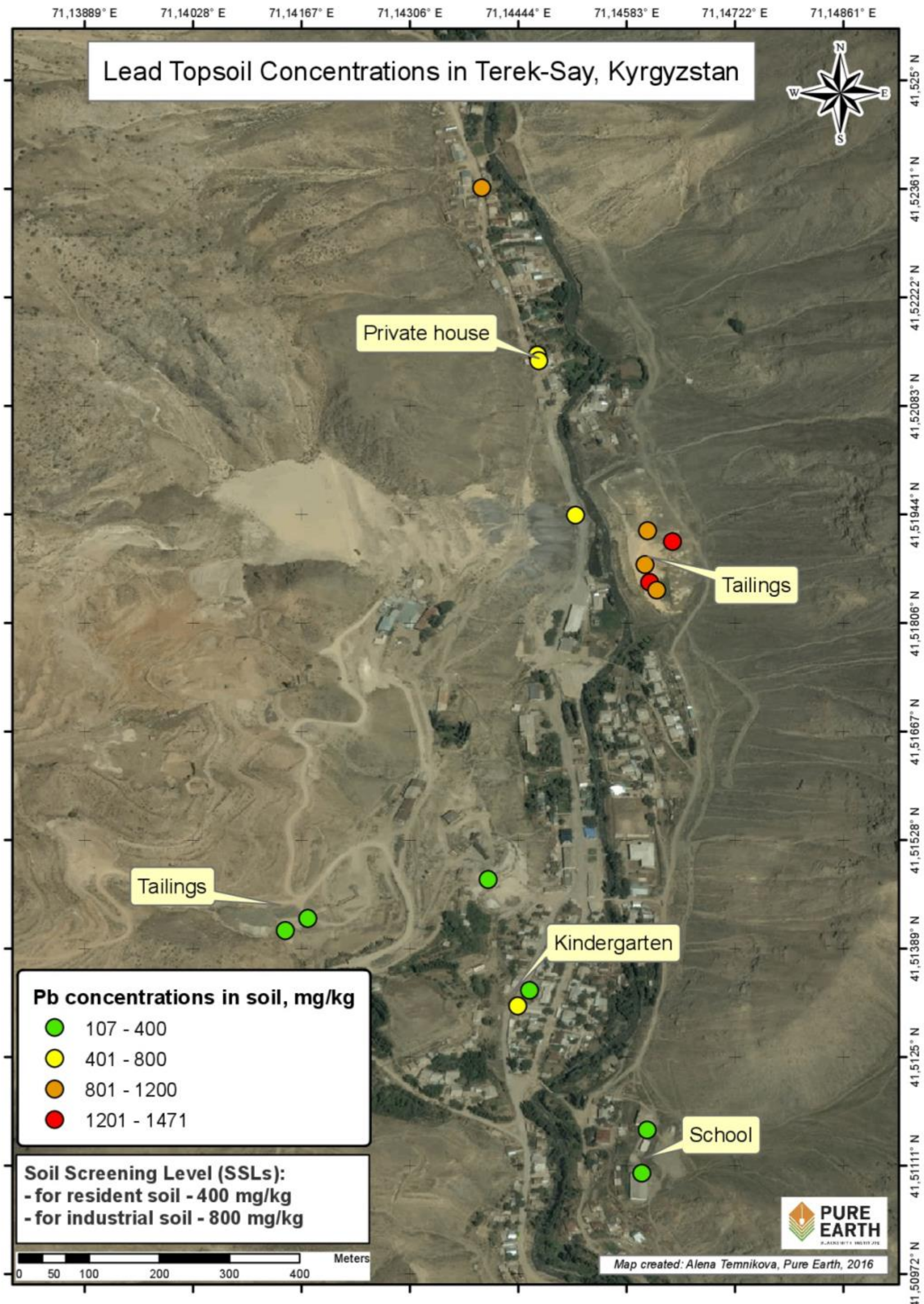

Fig. 10. Map of the site with sampling points

Table 3. Concentrations of contaminants (Terek-Say mining)

Latitude	Longtitude	Date	Sand/soil/ sediment	Location Description	As, ppm	Pb, ppm	Sb, ppm
41,46086	71,72236	04.10.2016	sand	tailings	890	249	419
41,51427	71,14175	04.10.2016	sand	mining area	1372	318	370
41,51477	71,14406	04.10.2016	sand	village	274	124,32	4050
41,61857	71,14616	04.10.2016	sand	tailings	137	1471	2175
41,51847	71,14622	04.10.2016	sand	tailings	142	833	1430
41,51943	71,14518	04.10.2016	sand	tailings near the road	55	643	2234
41,52148	71,14469	04.10.2016	sand	garden	160	640	2862
41,52141	71,14471	04.10.2016	plaster	wall of the house from the sand from the taikings	94	607	1852
41,52362	71,14398	04.10.2016	sand	garden	204	1000	2268
41,51101	71,14603	04.10.2016	sand	school, playground	199	116	122
41,51156	71,14610	04.10.2016	sand	school	72	224	838
41,51315	71,14444	04.10.2016	sand	kindergarten	160	448	1656
41,51335	71,14459	04.10.2016	sand	sandbox kindergarten	135	107	647

Kg-4856 - Kadamzhay antimony plant (Arsenic)

The investigated area of the city of Kadamzhai is located 110 km from the regional center of Batken. The city of Kadamzhai is located on the spurs of the Turkestan-Alai Range.
The main waterway of the region is the Shakhimardan River.

The sources of harmful substances (and organic dust) come from ore crushing, as well as tails of enrichment of the Kadamjai antimony combine. The combine was put into operation in 1936 and increased production up to 1990, reaching maximum capacity in that year - 17 thousand tons of product. With the collapse of the Soviet Union productivity declined in 1996 to 6 thousand tons and in 2000 to 1.5 thousand tons, mainly due to short supply of raw materials. At present the plant is practically not operational. In 2005, the foreign company ATF "Invest" became the owner of the plant.

As a result of the long-term exploitation of antimony deposits, over 7.5 million tons of solid waste in the form of waste rock, slag, cinder, slurry tailings and flotation have accumulated at the Kadamzhsky industrial site. These wastes contain hundreds of thousands of tons of compounds of mercury and antimony, arsenic, fluorites, heavy metal compounds and other toxic elements. Children play right on the tailings and inhale toxic dust.

Fig. 11. Measurement concentration of heavy metals in school yard

Fig. 12. Children going to school across the tailing

Fig. 13. Kadamzhaj plant

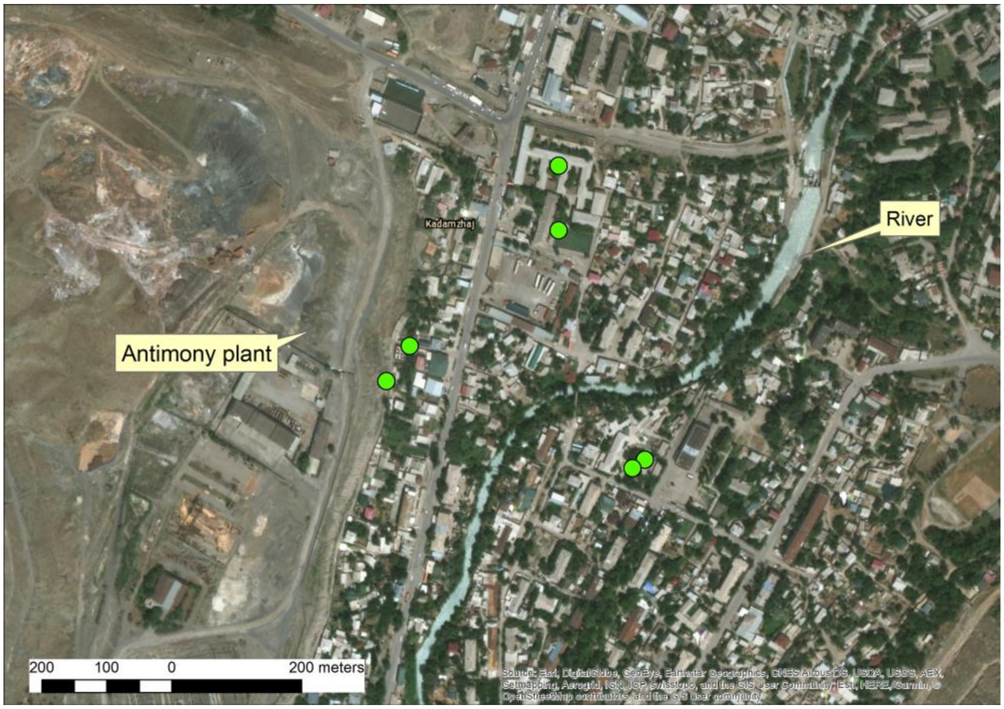

Fig. 14. Map of the site with sampling points

Table 4. Concentrations of contaminants (Kadamzhay antimony plant)

Longtitude	Latitude	Date	Sand/ soil/ sediment	Population	Sb, ppm	As, ppm
71,72079	40,12771	Sep 2016	soil	1000	751	38,14
71,71841	40,12544	Sep 2016	soil	400	4322	351,73
71,71873	40,12581	Sep 2016	soil	400	2567	367,82
71,72198	40,12461	Sep 2016	soil	500	280	41,27

71,72181	40,12452	Sep 2016	soil	500	294	27,99
71,72079	40,12703	Sep 2016	soil	1000	554	38,27

KG-4108 - Sovetskoe settlement, Kadamjai district (Detailed site assessment)

The town of Sovetskoe (recently renamed Kan) is located in Kyrgyzstan, in Batkensky region, about 70 km west of the district center Kadamzhay. The settlement is situated in the foothills of the Alai Mountains at an altitude of 1100 – 1200 m.

The dry climate and dominating winds create conditions for contamination of the settlement from lead containing dust from the tailings. Topography of the area is mountainous. The hydrological network is weak and represented by small streams and springs. The climate is moderate continental. The average annual rainfall ranges from 300 to 400 mm.

The Adrasman lead and zinc factory was built in Sovetskoe in 1950, and operated continuously until 1971. Lead and zinc ores were produced from open mines and refined at the factory. The ore processing facility functioned in the southeastern part of the town. The tailings are present right near the eastern edge of town. The area of tailings is about 11 hectares and the volume of stored materials is about 2.8 million cubic meters.

Open mining and processing of lead and zinc ores went on in the village for a long time and led to the disruption of the natural landscape. It caused erosion of non-cultivated dumps and tailings; pollution of soil, surface water and atmosphere. There is no sanitary buffer protection zone between the industrial and residential areas.

The precarious ecological situation in the region is caused by the long-term open-pit mining and processing of lead and zinc deposit. The development of the deposit started in the 1940. Currently, the deposit is conserved.

Fig. 15. Tailings near Sovetskoe

The area of tailings in the region is 175 ths. m2 with a total capacity of 2800 ths. m3, with high content of lead and heavy metal salts. The area of tailings is easily accessible to local residents and only partially capped. In addition to this, the sand from the tailings is frequently used by the local residents for construction purposes, including for the interior of their homes, for plastering inside and outside.


Fig. 16. Local residents use sand from tailings for construction purposes


Fig. 17. Red contaminated sand on the tailings, concentration of lead usually 2000-4000 ppm

Pure Earth 475 Riverside Drive, Suite 860 New York, NY, USA +1 212 647 8330 www.pureearth.org

Fig. 18. Even though the tailings do not contain radioactive materials the signs have the radiation symbol in order to scare the people away

Currently, the population of the village is about 1,300 people. They are exposed to lead and other heavy metals, such as cadmium and arsenic. Tailings are situated directly next to the village. In the summer, the population of the village, especially the children go through the tailings to a nearby lake and a small beach.

The original inhabitants of Sovetskoe, who lived there in the Soviet era, were aware of the dangers of the tailings, as many people had ties to the mining industry. However, in the 1990s and early 2000s many had left to work abroad. Most of the current residents have moved in from the country side and are completely unaware of lead health effects and toxicity of tailings materials.

There are three public education and childcare institutions: a kindergarten, a school, and a technical boarding school. All are located in the western part of the town. About 350 children attend these institutions. Some older children come to study to the boarding school from out of town.

In 2012, an initial environmental screening assessment was conducted by Pure Earth/Blacksmith Institute. Six samples of soil and sand were taken from the area near Sovetskoe together with the aid of the Head of the Sanitary and Hygienic Laboratory of Kadamjai Center of State Sanitary and Epidemiology, Makhmud Israilov. Sample analyses were done in the lab Alex Stewart in Bishkek. The results of analyses revealed soil lead concentrations up to 4,000 mg/kg (ppm).

This concentration is significantly higher than 32 mg/kg, the Maximum Allowable Concentration (MAC) for lead in Kyrgyzstan and 400 mg/kg, (the United States Environmental Protection Agency (EPA) cleanup trigger level).

In May 2016, through an invitation of the town administration a group of Pure Earth/Blacksmith Institute specialist led by Dr. Petr Sharov conducted a more detailed assessment using a potable XRF. In all, 77 collected soil samples were analyzed. The concentrations of lead in the most of samples exceeded the MAC levels. Local gardens, yards, streets, playgrounds of Sovetskoe are contaminated with lead concentrations reaching 4169 mg/kg institutions showed high level of contamination up to 2000 mg/kg.

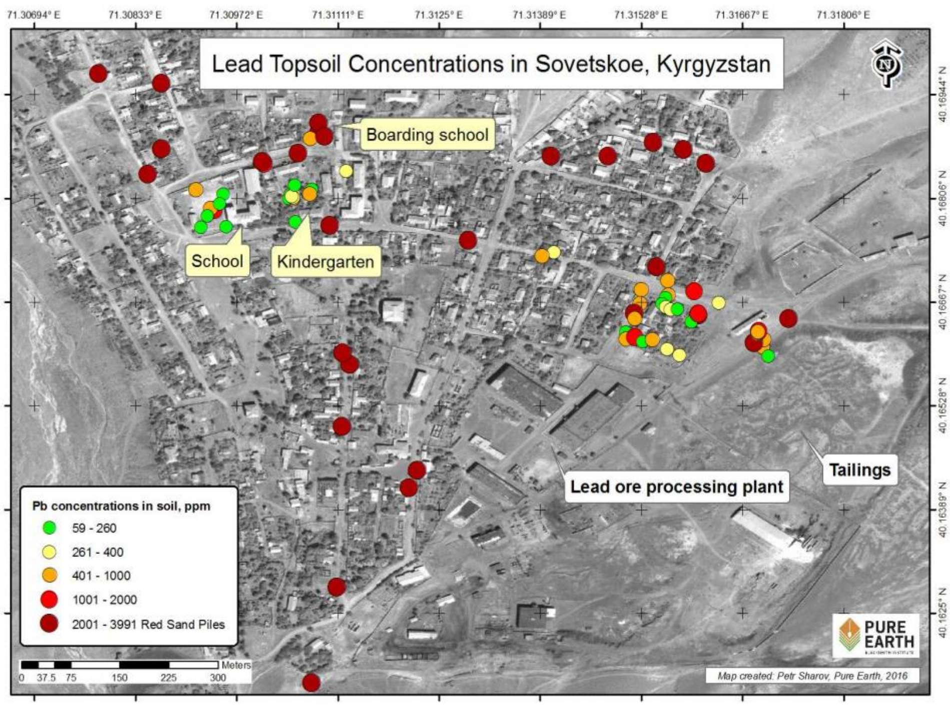

Fig. 19. Results of the assessment in 2016

Table 5. Concentrations of contaminants (Sovetskoe)

Longtitude	Latitude	Date	Sand/ soil/ sediment	Description of the sampling spot	Pb, ppm
71,31694	40,16606	May 2016	soil	the border of tailing	491
71,31702	40,16594	May 2016	soil	the border of tailing	161
71,31695	40,16616	May 2016	soil		695
71,31682	40,16612	May 2016	sand	pile of red sand near house	3991
71,31682	40,16612	May 2016	wall	wall, plaster	2340

71,31682	40,16612	May 2016	soil	near the wall	1511
71,31682	40,16612	May 2016	wall	wall of the fence	192
71,31687	40,16624	May 2016	soil	yard, near pumpkins	648
71,31689	40,16628	May 2016	sand	red sand near house	1971
71,31687	40,16626	May 2016	soil	garden	194
71,31687	40,16626	May 2016	soil	garden	430
71,31687	40,16626	May 2016	soil	garden	303
71,31687	40,16626	May 2016	soil	garden	352
71,31687	40,16626	May 2016	wall	wall of the house	4169
71,3173	40,16644	May 2016	soil	road	2129
71,31634	40,16666	May 2016	soil	road	364
71,316	40,16681	May 2016	soil	near the fence	1512
71,316	40,16681	May 2016	wall	wall of the fence	1711
71,31563	40,16695	May 2016	soil	at the yard entrance	774
71,31564	40,16675	May 2016	soil	yard	409
71,31561	40,16672	May 2016	soil	garden	207
71,31556	40,16664	May 2016	soil	yard, near house entrance	77
71,31562	40,1666	May 2016	soil	yard, under grapes	351
71,31568	40,16657	May 2016	soil	yard	294
71,31577	40,16657	May 2016	soil	garden	173
71,31606	40,16649	May 2016	soil	garden	2612
71,31606	40,16649	May 2016	soil	garden	2090
71,31606	40,16649	May 2016	soil	garden	36
71,31596	40,1664	May 2016	soil	channel	185
71,31606	40,16651	May 2016	soil		1674
71,31527	40,16683	May 2016	soil	near house	539
71,31525	40,16664	May 2016	soil	hole	106
71,31525	40,16664	May 2016	soil	street	806
71,31525	40,16664	May 2016	wall	wall	1376
71,31518	40,16651	May 2016	sand	pile of red sand near house	3644
71,31518	40,16644	May 2016	soil	at the yard entrance	519
71,31506	40,16626	May 2016	soil	at the yard entrance	232
71,31506	40,16617	May 2016	soil	by the ping-pong table	450
71,31519	40,1662	May 2016	soil	near house	1350
71,31519	40,1662	May 2016	wall	wall	992
		May 2016	dust	dust from vacuum cleaner (car)	161

71,31529	40,16613	May 2016	soil	yard	275
71,31529	40,16613	May 2016	soil	yard	260
71,31542	40,16616	May 2016	soil	garden	488
71,31542	40,16616	May 2016	soil	garden	93
71,31563	40,16604	May 2016	soil	garden	375
71,3158	40,16596	May 2016	soil	garden	341
71,31408	40,16733	May 2016	soil	near wall	400
71,31391	40,16728	May 2016	soil	near wall	408
71,30958	40,16767	May 2016	soil	near sportyard	468
71,30958	40,16767	May 2016	soil	near sportyard	92
71,30942	40,1679	May 2016	soil	jumping place	1230
71,30936	40,16791	May 2016	soil	football field	586
71,30916	40,16816	May 2016	soil	football field, by the goal	570
71,30932	40,16782	May 2016	soil	basketball	141
71,30923	40,16766	May 2016	soil	basketball	77
71,30954	40,16811	May 2016	soil	playground	59
71,30949	40,16798	May 2016	soil	playground	131
71,31053	40,16774	May 2016	soil	near entrance	228
71,31049	40,16704	May 2016	soil	liana	613
71,31049	40,16704	May 2016	soil	liana	823
71,31049	40,16704	May 2016	soil	liana	406
71,31049	40,16704	May 2016	soil	liana	149
71,31044	40,16805	May 2016	soil	crossing	169
71,31046	40,16611	May 2016	soil	benches	259
71,3105	40,16811	May 2016	soil	rocket	336
71,3105	40,16807	May 2016	soil	tree near liana	392
71,31048	40,16808	May 2016	soil	tree on the other side of liana	310
71,31075	40,16817	May 2016	soil	sandbox	243
71,31072	40,16811	May 2016	soil	small house	447
71,31052	40,16823	May 2016	soil	slide	113
71,3101	40,16852	May 2016	sand	pile of red sand near house	1085
71,31085	40,16893	May 2016	sand	volleyball field	2047
71,31085	40,16906	May 2016	sand	volleyball field	2253
71,31073	40,16885	May 2016	soil	sport ground	689
71,31123	40,16842	May 2016	soil	near the main building	313
71,31075	40,16817	May 2016	soil	statue	1492

Implementation strategy/coordination with government

In 2014, a meeting was held between the representatives of Pure Earth/Blacksmith Institute, their partner organization Ecois in Bishkek, and government agencies such as the Agency for the Treatment of Tailings under the Ministry of Public Safety, the State Agency for Environmental Protection and Forestry, the State Inspectorate for Environmental and Technical Security, the Department of Disease Prevention and the State Sanitary-Epidemiological Surveillance. At the meeting, the preliminary results of the TSIP program were demonstrated, and feedback from government representatives was received. Suggestions for future work were taken into account. All interested persons were given access to the database to work with the available information.

During the project, researchers worked closely with local government officials, stakeholders residing directly in contaminated areas, and doctors from local hospitals. Such interaction is very important for a deep understanding of environmental problems and how to eliminate them.

Based on the analysis of the available sites in the database, the sites with the highest priority were selected, where, with the support of the EC, UNIDO, and local authorities, the district of Okmotu implemented pilot projects to clean up and reduce the risk to public health in the village of Sovetskoe and Naiman.

Pollution Sources and Key Pollutants

The 47 sites evaluated in Kyrgyzstan since 2007 are located in Issyk-Kul, Chui, Naryn, Osh, Batkent, Talas and Jalal-Abad regions. Sources of pollution include mining industries, storage facilities for obsolete pesticides, agriculture, lead mining, chemical factories, landfills, and waste treatment facilities. The distribution of plots by type of industry is shown in Table 6 and Figure 20.

Table 6: The number of sites as categorized by pollution source assessed by Pure Earth's investigators in the TSIP Database

Industry	**Number of Sites**
Agriculture	1
Mining and Ore Processing	16
Industrial/Municipal Dumpsite	3
Lead Battery Recycling	1
Pesticide Manufacturing	22
Chemical Manufacturing (acids, organics, base chemicals)	1
Lead Mines	2
Naturally Occurring	1
Total	**47**

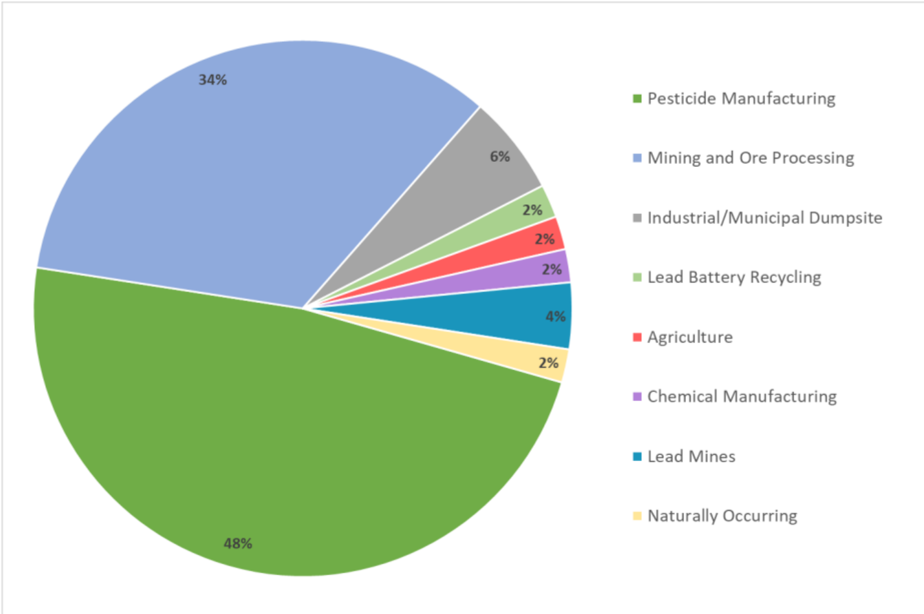

Figure 20. Segmentation of sites as categorized by pollution source assessed by Pure Earth's investigators in the TSIP Database

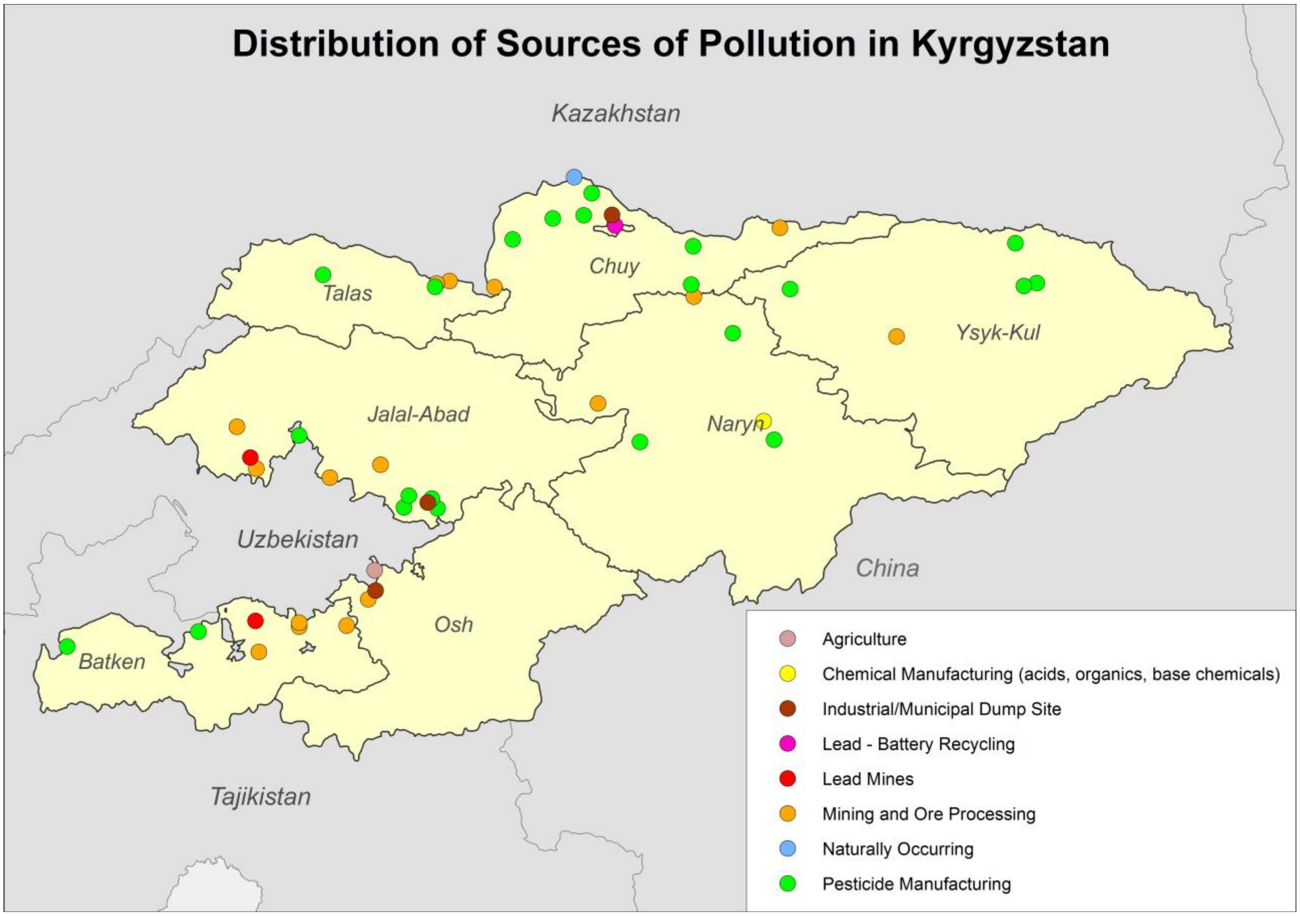

Figure 21. Geographical Distribution of pollution sources in Kyrgyzstan

More than 50% of the assessed sites are contaminated with pesticides (mostly DDT). The remaining sites are contaminated with lead, arsenic, and elemental mercury. There is also radioactive contamination with uranium and thorium.

The types of pollutants that were found at the sites are shown in Table 7 and Figure 22.
Figure 23 shows the geographical distribution of sites ranked by type of pollutants in Kyrgyzstan.

Table 7: The number of sites as categorized by contaminant assessed by Pure Earth's investigators in the TSIP Database

Key Pollutant	# of sites

Pesticides	24
Radiation	7
Lead	6
Arsenic	4
Mercury (Elemental)	3
Uranium	2
Other	1
Total	47

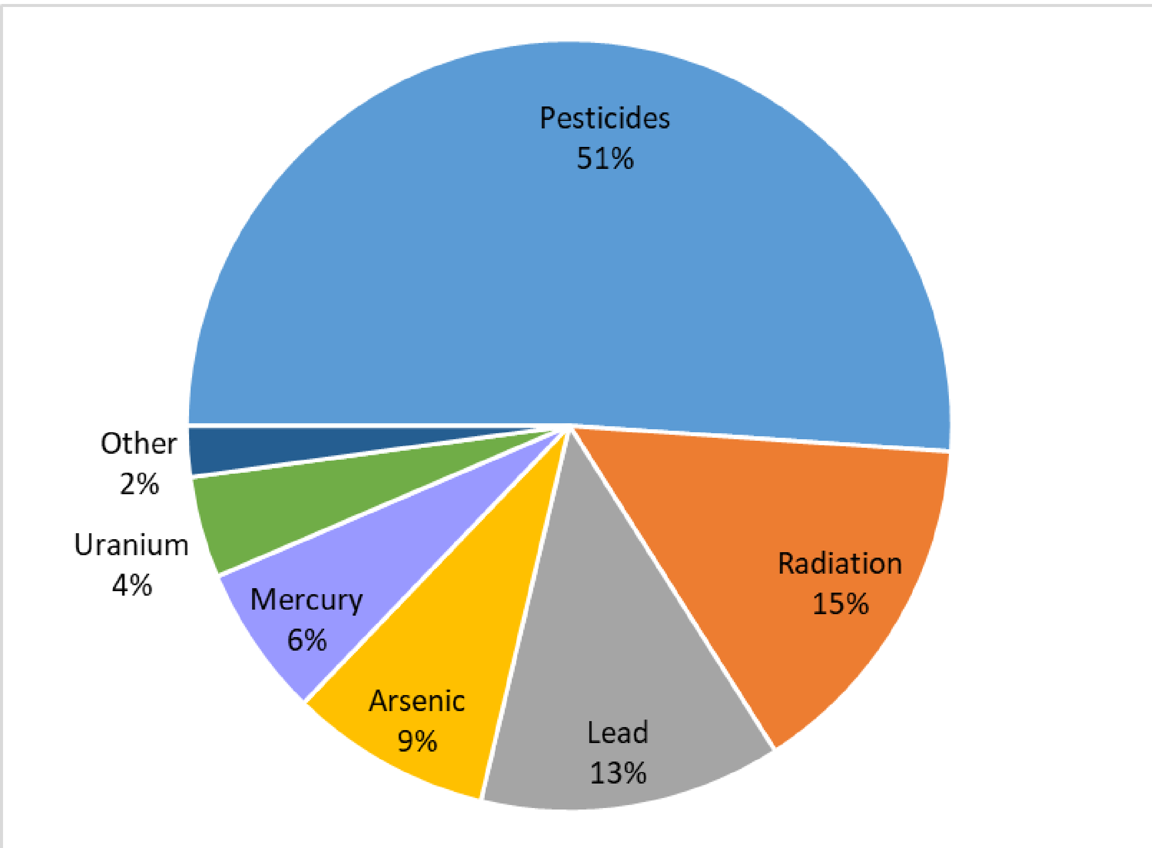

Figure 22. Polluted sites in Kyrgyzstan broken down by type of pollutant

Pure Earth 475 Riverside Drive, Suite 860 New York, NY, USA +1 212 647 8330 www.pureearth.org

`

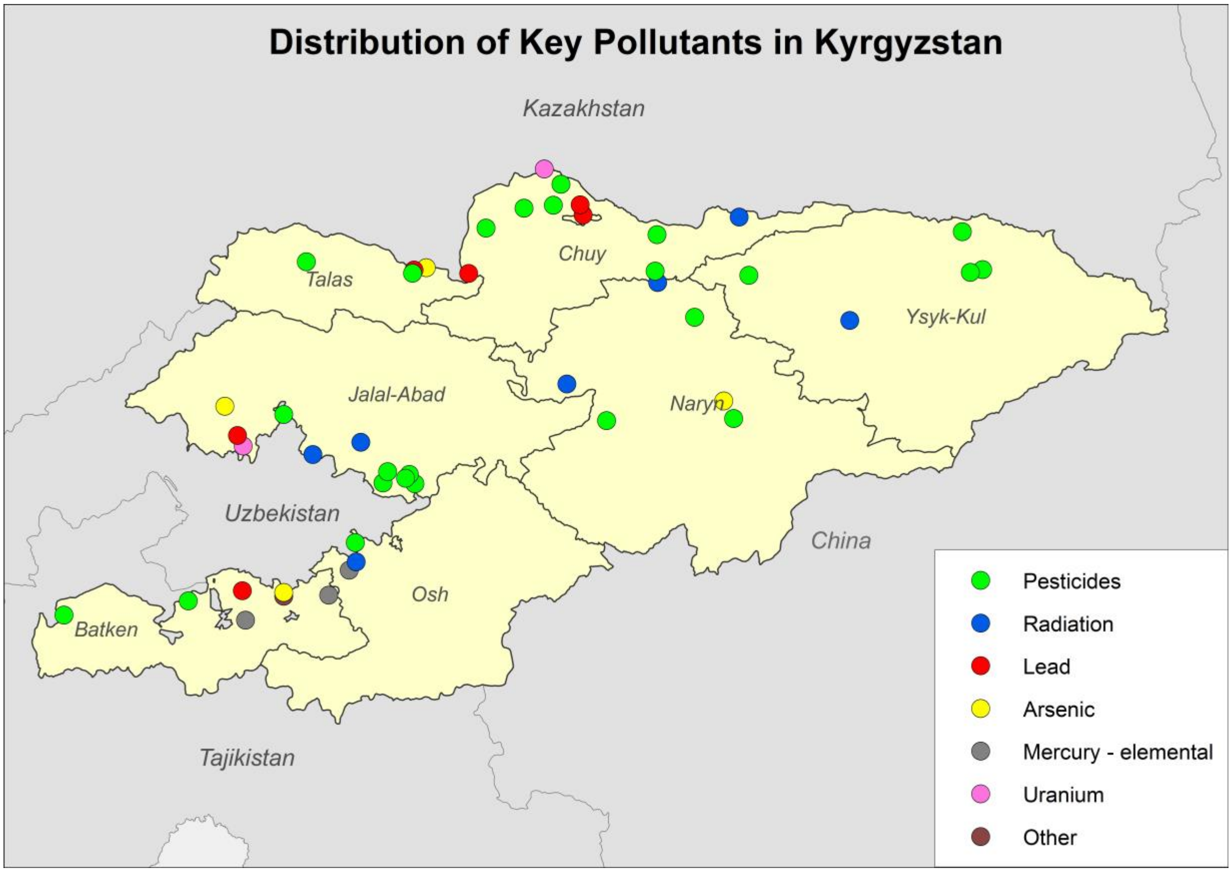

Figure 23. Map of contaminated sites in Kyrgyzstan

Table 8 shows the geographic location of the polluted sites in Kyrgyzstan, the site names, number of people living nearby, the number of people at risk, and also the maximum concentrations of each pollutant.

`

TSIP Sites in Kyrgyzstan

Table 8: List of Sites Assessed in Kyrgyzstan

SiteID	Site Name	Source of Industry	Key Pollutant	Total population at risk	Sampling media	Maximum test result	Units
KG-3323	Ak-Tyuz Mining and Milling Site	Mining and Ore Processing	Radiation	260	Soil - Agriculture	75	uR/hr
KG-4673	Aksy selkhozkhmia, Zhif-Prom	Pesticide Manufacturing	Pesticides (DDT)	415	Soil - Agriculture	0,15	mg/kg or ppm
KG-4102	Battery collection point in Bishkek	Lead - Battery Recycling	Lead	100		No data	
KG-3433	Bordu village Kashka,	Mining and Ore Processing	Radiation	190	Soil - Residential	0,00041	mSv/hr
KG-2968	Chauvay Mercury Mine, Kyrgyzstan	Mining and Ore Processing	Mercury - elemental	1500	Water - Drinking	60	ug/l or ppb
KG-4677	ChCh-ChKAAp-1 Chui district, village Kyzyl-Asker, former Airstrip ChCh-ChKAAp-1	Pesticide Manufacturing	Pesticides (DDT)	32	Soil - Agriculture	0,4	mg/kg or ppm
KG-4659	Chekabad	Agriculture	Pesticides (DDT)	1504	Soil - Agriculture	3,8737	mg/kg or ppm
KG-4676	ChKChKgAp1 Kemin District, village Chym Korgon	Pesticide Manufacturing	Pesticides (DDT)	43	Soil - Agriculture	0,2	mg/kg or ppm
KG-4687	ChMPPCS-1 Moskovskiy district, village Predtechenka, union of farms Chekir-Suu ChMPPCS-1	Pesticide Manufacturing	Pesticides (DDT)	62	Soil - Agriculture	0,1	mg/kg or ppm
KG-3417	Emgekchil	Chemical Manufacturing (acids, organics, base chemicals)	Arsenic	2260	Soil - Industrial	109	mg/kg or ppm
KG-	Jany Jer	Pesticide	Pesticides	51	Soil -	0,4	mg/kg

4678		Manufacturing	(DDT)		Agriculture		or ppm
KG-4856	Kadamzhay antimony plant, Osh, Kyrgyzstan	Mining and Ore Processing	Other	4800	Soil - Residential	4322	mg/kg or ppm
KG-3419	Kadjisai	Mining and Ore Processing	Radiation	100	Soil - Residential	0,00172	mSv/hr
KG-4619	Kara-Balta, Mining Processing Plant, Bishkek, Kyrgyzstan	Mining and Ore Processing	Lead	1200	Soil - Residential	88	mg/kg or ppm
KG-1200	Khaidarkan area	Mining and Ore Processing	Mercury - elemental	20097	Soil - Industrial	1249	mg/kg or ppm
KG-3906	Kochkor, Oroobashy	Pesticide Manufacturing	Pesticides (HCH)	760	Soil - Residential	38	mg/kg or ppm
KG-4675	LLC (Limited liability company) Jalal-Abad Selkhozkhimia	Pesticide Manufacturing	Pesticides (DDT)	1250	Soil - Residential	0,16	mg/kg or ppm
KG-288	Mailuu-Suu	Mining and Ore Processing	Radiation	25000	Soil - Agriculture	0,00092	mSv/hr
KG-3305	Min-Kush settlement residential area	Mining and Ore Processing	Radiation	3300	Soil - Residential	0,005	mSv/hr
KG-4527	Naiman Village, Nookatsky District	Mining and Ore Processing	Mercury - elemental	1000	Soil - Residential	1335,3	mg/kg or ppm
KG-3428	Orozbekov	Mining and Ore Processing	Arsenic	3500	Water - Irrigation/Bathing/Washing	1260	ug/l or ppb
KG-4685	Pesticide Storage of district selkhozkhimia, Naryn town	Pesticide Manufacturing	Pesticides (DDT)	160	Soil - Residential	0,5	mg/kg or ppm
KG-4669	Poligon of OP - Suzak B	Pesticide Manufacturing	Pesticides (DDT)	40	Soil - Agriculture	0,5	mg/kg or ppm
KG-3415	Shekaftar	Mining and Ore Processing	Uranium	1000	Water - Irrigation/Bathing/Washing	800	ug/l or ppb
KG-3475	Solid domestic garbage dump,	Industrial/Municipal Dump Site	Lead	10000	Soil - Residential	7,57	mg/kg or ppm

	Bishkek,						
KG-4108	Sovetskoe settlement, Kadamjai district	Lead Mines	Lead	1500	Soil - Residential	3644	mg/kg or ppm
KG-1569	Sumsar area	Lead Mines	Lead	2140	Soil - Residential	614,49	mg/kg or ppm
KG-2959	Suzak A	Industrial/Municipal Dump Site	Pesticides (DDT)	4192	Soil - Industrial	700	mg/kg or ppm
KG-4107	Tash-Komur, Kyzyl-Jar	Mining and Ore Processing	Radiation	95	Soil - Industrial	0,00572	mSv/hr
KG-4686	TBAADKS Bakai-Atinskiy district, village authority Ak-Dobo, village Kyzyl-Sai TBAADKS	Pesticide Manufacturing	Pesticides (DDT)	87	Soil - Agriculture	0,3	mg/kg or ppm
KG-4837	Terek-Say mining	Mining and Ore Processing	Arsenic	4950	Soil - Agriculture	1372	mg/kg or ppm
KG-4746	town Batken, former district Selkhozkhimia	Pesticide Manufacturing	Pesticides (Other)	267	Soil - Industrial	0,33	mg/kg or ppm
KG-4670	Ugut,	Pesticide Manufacturing	Pesticides (DDT)	80	Soil - Agriculture	0,4	mg/kg or ppm
KG-4110	Uluu-Too dumps of antimony factory	Industrial/Municipal Dump Site	Radiation	500	Soil - Agriculture	0,0006	mSv/hr
KG-4090	v, Kamyshanovka	Naturally Occurring	Uranium	35	Soil - Agriculture	465	mg/kg or ppm
KG-4679	Village authority Heroes Panfilovs	Pesticide Manufacturing	Pesticides (DDT)	35	Soil - Agriculture	0,2	mg/kg or ppm
KG-4739	Village Bulak-Bashy, rural district Kulundu, Leilek district, Batken oblast	Pesticide Manufacturing	Pesticides (Other)	153	Soil - Agriculture	0,42	mg/kg or ppm
KG-4680	village Chat-Kul	Pesticide Manufacturing	Pesticides (DDT)	15	Soil - Agriculture	0,2	mg/kg or ppm
KG-3481	village Kopure-Bazar (Karakol), gold deposit , Aktash	Mining and Ore Processing	Arsenic	70	Soil - Industrial	40	mg/kg or ppm
KG-3517	village Kopure-Bazar (Karakol),	Mining and Ore Processing	Lead	6120	Soil - Residential	1080	mg/kg or ppm

`

	gold-copper deposit, Andash						
KG-3482	village Kopure-Bazar (Karakol), territory of the former brick factory	Pesticide Manufacturing	Pesticides (DDT)	30	Soil - Industrial	734	mg/kg or ppm
KG-4740	Village Seidi-Kum burial sites of toxic chemicals	Pesticide Manufacturing	Pesticides (DDT)	30	Soil - Agriculture	0,37	mg/kg or ppm
KG-4674	Village Shumkar former storage of Selkhozkhimia Mogol-Korgon - Mogol-Korgon	Pesticide Manufacturing	Pesticides (DDT)	200	Soil - Agriculture	0,12	mg/kg or ppm
KG-4681	VKAST, Teplokluchenka, former storage of selkhozkhimia	Pesticide Manufacturing	Pesticides (Lindane)	1418	Soil - Residential	0,9	mg/kg or ppm
KG-4682	YKASCH, Chelpek, garden plot YKASCH, Chelpek	Pesticide Manufacturing	Pesticides (DDT)	80	Soil - Residential	2,3	mg/kg or ppm
KG-4684	YKBSSH, Balykchy former storage of selkhozkhimia YKBSSH, Balykchy	Pesticide Manufacturing	Pesticides (HCH)	170	Soil - Residential	2,9	mg/kg or ppm
KG-4683	YKTBZ, Balbai, grain storage	Pesticide Manufacturing	Pesticides (Lindane)	55	Soil - Residential	4,1	mg/kg or ppm

LESSONS LEARNED

Regular meetings are needed between the government representatives of Kyrgyzstan and non-profit organizations such as Pure Earth/ Blacksmith Institute and its partners to effectively study contaminated sites in the country. Once studies are finished, findings on the sites should be presented. Such meetings are very important for finding joint solutions to the problem of toxic pollution in Kyrgyzstan and developing a strategy for further work to reduce public health risks. Such meetings were organized twice by Pure Earth/ Blacksmith Institute and NGO "Ecois-Bishkek". The first workshop was in 2014 and the second in 2018. The organization of meetings is effectively carried out through the national partnership

In order to share experiences and increase the capacity of local partners, it is desirable to hold regional seminars involving the countries of Eastern Europe, the Caucasus and Central Asia. For more rapid assessment of contaminated sites, it is necessary to consider the possibility of renting portable screening equipment available in the country.

Challenges

It was challenging to work in remote areas to conduct sampling and delivering samples to the laboratory.

Another challenge was lack of cooperation with the State Agency of Environment Protection and Forestry. The Agency was informed about TSIP activities in 2012 and a representative from the agency was present at the workshops conducted during the project, including the inception training in 2012 and presentation of results in 2014. Additional information was provided in 2016 and 2017 including access to the database and reports on conducted pilot projects and assessments. However, the Agency claimed that they did not have any information and therefore were not involved in the project. In order to overcome this on November 1st 2018 a workshop presenting TSIP work and updated database was conducted jointly with the State Agency of Environment Protection and Forestry. The workshop was participated by other stakeholders and government agencies including Ministry of Agriculture, Ministry of Health, Ministry of Emergency Situations, NGOs and national experts. At the meeting the State Agency of Environment Protection and Forestry thanked Blacksmith Institute for TSIP program achievements and assigned a specialist to be trained and use the database.

Recommendations

•To work in the country through a partner organization, formally entering into contracts with it and providing for certain administrative costs (office, accountant, headwear), which legitimates Pure Earth within Kyrgyzstan, simplifies and protects the national coordinator from financial claims (by transferring money to the partner NGO to carry out work).

• On all official reports and presentations use the logo of not only the donor and Pure Earth, but also the logo of the national partner.

• Involve local experts and medical and social work staff, as local government institutions do not always have the capacity and experience to carrying out work (for example, medical monitoring).

• Continue working with the Ministry of Health on monitoring the harmful effects on children of lead and other toxic pollutants.