

About Blacksmith Institute and the Toxic Site Identification Program

Blacksmith Institute

Blacksmith Institute is a New York based not-for-profit organization that partners with governments, NGOs and community groups to solve life-threatening pollution problems in low- and middle-income countries. In addition to leading the Toxic Site Identification Program, Blacksmith conducts cleanup projects to mitigate health risks at toxic sites. See Blacksmith's website at www.blacksmithinstitute.org.

Toxic Site Identification Program

The Toxic Site Identification Program (TSIP) is a joint effort between Blacksmith Institute, United Nations Industrial Development Organization, World Bank, European Commission, Asian Development Bank, and Green Cross Switzerland. The program endeavors to identify and screen contaminated sites in low- and middle-income countries with a potential human health impact. The TSIP is not intended to be a comprehensive inventory of such sites, but rather an effort to begin to understand the scope of the problem globally.

As part of the TSIP, more than 1,500 sites have been screened in 47 countries. An additional 1,000 sites have been identified for future screening. The actual number of contaminated sites in low- and middle-income countries with a potential human health impact is clearly much greater. By comparison, there are an estimated 90,000 contaminated sites in the United States alone. No good estimates currently exist on the potential number of sites in low- and middle-countries, but the total is likely to exceed the current number of sites identified by the TSIP by at least an order of magnitude.

Between 2012 and 2014, the program will be expanded to new regions where gaps existed previously. In 2012, the program will be expanded to 15 countries in Latin America, Africa, Eastern Europe and Central Asia.

Once Blacksmith has compiled a representative inventory of polluted sites in a given country, the organization works with the national government to assess priorities, develop action plans, and attract international support to address the most severe human health risks.

Program Scope

The 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).

Risk Screening Model: Pollutant – Migration – Pathway – People

Central to Blacksmith’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.

Blacksmith 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 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.

Pollutant. There are many substances that are hazardous to peoples’ health. In Blacksmith’s work on legacy industrial, artisanal and mining sites, there are a

relatively small number of key pollutants that occur repeatedly. These include heavy metals, some organic chemicals, and in certain places, radionuclides.

The form and characteristics of the pollutant are important (mercury, for example, is relatively harmless as a solid but toxic as a vapor). The amount of the pollutant is also critical. Investigators try to estimate the total area affected by a hazardous material and the level of contamination. A key factor here is the concentration, which is measured by sampling and subsequent testing. The critical parameter is the “over-standard” – the factor by which the concentrations of the pollutant exceed relevant international standards. This is the quantitative indicator of the hazard posed by the site.

Migration Route. The migration route should not be confused with the “pathway.” Pathway relates to how a substance enters the body. Migration route refers to how a contaminant is spread from a source to a community or the environment. Common migration routes include:

- airborne emission of dust or vapors from a specific source
- spread of dust by wind from waste piles or contaminated areas
- spread of dust or contaminated waste or soil by direct transport, such as by trucks carrying waste
- spread of dust or contaminated soil by water, such as in storm runoff, and then deposition in an area used by people
- transport of soluble toxics or very fine particles in surface or ground water, to places where the water is used as a drinking water source (such as a well, pond or stream)
- uptake of toxic contaminants into plants or animals, most often from contaminated water, which then enter the food chain of people

Pathway. A pathway is the physical mechanism by which the pollution enters the body (See section on “Toxicity” for more detail.) Substances can be toxic through ingestion (swallowing, often in food or water), through inhalation (as dust or vapor), or by direct dermal (skin) contact. Radioactivity can, in some forms, act at a distance without direct contact and so proximity itself is a pathway. Note that most dust, unless of a very small size (less than 2.5 microns) actually enters the body through ingestion. Dust that is breathed in is often caught on nose, throat and lung tissue and then coughed up and swallowed.

In practical terms, people can be directly exposed to toxic chemicals from a waste site if they inhale or ingest dust or vapor from the site, get dust or vapor from the site on their skin, or drink groundwater or surface water flowing under or through the site. People can be indirectly exposed if they eat food (plants or animals) grown on land contaminated by dust or vapor from the site or irrigated with water contaminated with toxic chemicals from the site.

People. A hazard becomes a risk when a population is actually exposed to or impacted by the pollution at a dose high enough to potentially cause health

impacts. A challenge for the investigator is to identify the relevant population, since the exposure will be determined by the levels of contamination, substance toxicity, migration routes and pathways that exist. The first step is to identify all the population groups within the probable area of influence of the polluted site, starting with populations immediately adjacent to the site, as well as those downstream and downwind from the site. This is best done using a local map and local information, by identifying nearby villages and urban areas (with estimated populations). Not all of these people will be at risk: that depends on the pollutant, migration route and pathways.

The overall result of going through this logic is to be able to identify the populations that are potentially affected through the Pollution-Migration-Pathway-People connection. These people are the population at risk.

Public health risk is easier to demonstrate when the migration routes are direct, the pathways are clear and the data on contamination is good. However, the objective of the ISS is not to conclusively prove or quantify a specific health impact. It is to identify a credible and significant risk to a population. Further studies are generally necessary to evaluate and quantify the risks and health impacts, which then hopefully lead to interventions to reduce the risks and impacts. Note that interventions can be focused on any or all of the components creating a toxic contamination problem; elimination of the source (such as waste removal or elimination of use of a toxic substance in a process); control of migration routes (such as installation of pollution control equipment or covering waste piles); elimination of pathways (such as covering or paving contaminated areas or providing clean drinking water sources); or reducing the people in contaminated areas (such as by fencing off disposal sites.)

TSIP Overall Process

Step 1: Create a National Inventory of site screenings

Step 2: Hold a conference with government Ministries, local partners, Blacksmith Institute and international donor agencies. Review National Inventory to identify national priorities and critical sites. Identify sources of funding for cleanup projects. Create a “National Toxics Action Plan.”

Step 3: Implement cleanup projects at priority sites

TSIP Management Structure

TSIP Director – Bret Ericson is the TSIP Director and oversees all aspects of the project.

Regional Directors – Each region has a Regional Director in the New York office (see contacts list). This person oversees Regional

Coordinators in their regions. The Regional Director is responsible for setting regional priorities and budgets, coordinating regional activities, reviewing site screenings, and processing financial reports.

Regional Coordinators – Regional Coordinators are Blacksmith staff members or consultants who are located in the region they coordinate. Regional Coordinators are responsible for coordinating site screenings with Investigators, reviewing site screenings to ensure quality, reviewing financial reports, and helping Regional Directors with other regional program activities.

Country Coordinators – Blacksmith has Country Coordinators in countries where the organization is very active, including China, Indonesia, India, Mexico, Philippines, Russia, Ukraine, and Vietnam, among others.

Investigators – Investigators are paid consultants that conduct site screenings in their home country. Investigators report to the Regional or Country Coordinator, and must coordinate their site screening schedule with that Coordinator.

