Pilhas de escória dispostas sobre o solo, a céu aberto

Santo Amaro (BA) coexists with socio-environmental liabilities of former metallurgical industry

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DISTRICT
BA - Santo Amaro

LATITUDE
-

LONGITUDE
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SUMMARY

The population of Santo Amaro city coexists with an environmental liability of approximately 500 tons of waste contaminated with heavy metals arising from Plumbum company, which ended its activities in 1993. Considered one of the world's most lead-polluted cities, the municipality is a reference in the literature for the study of lead and cadmium contamination.

CASE DESCRIPTION

The facilities of Plumbum Mining and Metallurgy Ltd., located in Santo Amaro [formerly called Santo Amaro da Purificação], in the Recôncavo Baiano, were abandoned in 1993, leaving a liability of 490,000 tons of waste contaminated with heavy metals, especially lead and cadmium. A large part of the region's population, including former employees from the metallurgical company, was contaminated with industrial waste as well as the soil, sediments, fauna and shellfish from the estuary of the Subaé River (ANJOS; SÁNCHEZ, 2001).

With 492,912 km² and 57,800 inhabitants (IBGE, 2010), the historical city of Santo Amaro is located 100 km from the capital, Salvador, and has its economy based on the service sector (MANZONI; MINAS, 2009).

It all started in 1960 when the Brazilian Lead Company (COBRAC), at the time belonging to the multinational group Penarroya Oxide S.A. (today Metaleurop S.A.), began producing lead ingots in Santo Amaro (ANJOS; SÁNCHEZ, 2001).

In 1974, COBRAC made the first application for a permit, seeking to increase its production capacity from 30,000 tons of metallic lead to 45,000 tons/year as well as to modernize the facilities of the metallurgical complex (OLIVEIRA, 1977 apud ANJOS; SÁNCHEZ, 2001). The state government of Bahia, however, dismissed the application (MANZONI; MINAS, 2009) and suggested transfer the project to the Aratu Industrial Center (CIA), in the metropolitan region of Salvador, taking into account the environmental aspects and the deterioration state which the venture was in (OLIVEIRA, 1977 apud ANJOS; SÁNCHEZ, 2001).

Crianças expostas ao rejeito contaminado

The permanence of the metallurgical company in the sentenced place caused the continuity of the process of environmental degradation, contributing for the contamination of the water, soil, flora and fauna, as well as the local people, mostly children, by lead and cadmium (CARVALHO et al., 2003).

In 1989, the plant was sold to company Plumbum Mining and Metallurgy Ltd., belonging to the Brazilian group Trevo (ANJOS; SÁNCHEZ, 2001). Two years later, the company applied for an operating license at the Environmental Resources Center (CRA), Bahia's environmental agency. CRA issued an opinion with 27 conditions for release of license for three years. However, "the conditions were not met and, in December 1993, Plumbum ended its activities in Santo

Amaro" (PNUD, 2003 apud MEYER; GENERINO; CRISTANI, 2007, p. 3).

To produce lead alloys in Santo Amaro, the metallurgical company used lead ore mined and processed in the municipality of Boquira, southwestern Bahia (MANZONI; MINAS, 2009). Due to mining depletion in Boquira, Plumbum began importing ore from Peru (MACHADO et al., 2004).

During the beneficiation process there was little control towards handling of the environmental damage as well as towards measures of protection and security for employees and residents. The slag was considered harmless and piled up on the ground around the plant and lead particulate, caused by the sintering process, was expelled by the chimney (SOBRAL, 2008). After the company was closed, the scum and the contaminated soil were the main sources of environmental pollution by lead in the municipality (CARVALHO et al., 2003).

Efeito do transbordamento da barragem de rejeitos

During the years of operation of Plumbum Mining and Metallurgy Ltd., approximately 900,000 tons of lead concentrate were produced, generating millions of tons of waste and about 500,000 tons of slag (MANZONI; MINAS, 2009). Ever since the metallurgical company began its activities, the municipality has presented signs of contamination, with the death of animals in the areas close to the enterprise (ANJOS, 2001), located Northwest of the urban area of Santo Amaro, 300 meters from the Subaé River, which is named after the hydrographic basin, being its main river (MANZONI; MINAS, 2009).

Among the main environmental impacts caused by the metallurgical activities in the municipality, we can cite: contamination of the waters of the Subaé River by toxic substances, impacting the communities that drew their livelihood from the river; air pollution by smoke from the industry - only after determination of Justice in 1989, the company started to use filters in its chimney (ALCÂNTARA, 2010); large piles of slag directly deposited on the ground, open-air, threatening groundwater and the Subaé River (CARVALHO et al., 2003); distribution by the company of slag contaminated with 2% to 3% lead for use as landfill - by the population - and on street paving and public constructions, as nurseries and schools, by the city; and soil contamination by large amounts of solutions with contaminants that seeped underground during the years of the plant's operations (ALCÂNTARA, 2010).

The high level of lead and cadmium in the air, water and soil, also undermined the economic activities in the region, such as: fishing (ALCÂNTARA, 2010), fruit and vegetable production, and livestock breeding. In addition, it caused damage to the health of the population (MANZONI; MINAS, 2009), particularly workers, which did not use, at any time, adequate protection for the handling of raw materials considered to be highly toxic by the World Health Organization (WHO) (ALCÂNTARA, 2010; SOBRAL, 2008).

From 1975 on, research studies developed by the Federal University of Bahia (UFBA) in the Subaé River basin identified as causes of contamination: the installation of the metallurgical company in an area where low-speed winds and constant thermal inversions predominated, damaging the dispersion and facilitating the deposition of particulates in the urban area; the proximity of the company to the Subaé riverbed and its flood plains; overflow of the tailings pond in periods of heavy rain; low flow of the Subaé River, damaging the dilution and dispersion of the effluents discharged without treatment; improper slag disposal at landfills, and its reuse for the construction of roads, houses etc., which increased the contamination of soil, surface water, groundwater and the population living in the surroundings of the enterprise; high concentrations of metals in the mangroves of the Subaé River estuary, contaminating molluscs and damaging the feeding base of the population; particulates released by the metallurgical company chimney; and the fact that the company considered the slag to be harmless, depositing it without any technical criteria (ANJOS; SÁNCHEZ, 2001).

In 1980, a new study by UFBA found that 96% of the children residing less than 900 m from the company chimney showed blood lead and cadmium levels above the threshold of toxicity. The study also detected that the level of metals in the blood of the population grew as their place of residence approached the premises of the metallurgical company (MACHADO et al., 2004).

In 1998, another study carried out by UFBA, with 1-to-4-year-old children who were born after the closure of the metallurgical company, found that the environmental liabilities left by Plumbum remained as a source of relevant exposure to lead poisoning (CARVALHO et al., 2003). Probably, as a result of the contamination, many people have been affected by saturnism, or lead poisoning, a disease that weakens the bones, paralyzes hands, causes acute pain, as well as impotency in men and abortion in women and fetal malformation. Due to excess of metals in the water and soil, the incidence of other diseases, such as anemia, kidney damage, high blood pressure, lung cancer, among others, has also increased (BAHIA JÁ, 2011).

Because of the big liability left and its impacts, in the years 1994 and 1995, CRA ranked the Plumbum slag as hazardous waste due to its toxicity. Mitigating measures were then requested, which included, at first, putting up fences and signs in the entire area where waste was deposited. In addition, the company was demanded to: design a plan for suitable slag disposal; install monitoring wells for the detection of possible pollutants in groundwater; and carry out studies to prevent contamination from spreading and to allow slag encapsulation (ANJOS; SÁNCHEZ, 2001).

Faced with Plumbum's refusal to meet the requirements of the environmental agency, CRA has taken legal measures and initiated a search for implementation of an environmental management plan for contaminated sites with in situ industrial waste, in partnership with the University of São Paulo (USP), the Foundation for Research Support of the State of São Paulo (Fapesp) and the Superintendency of Geology and Mineral Resources (SGM) (ANJOS; SÁNCHEZ, 2001).

The research ended up generating the Purifica project, financed by the Study and Project Funding Agency (Finep) and developed by UFBA, USP, CRA and the Center for Studies, Research and Development of the State of Bahia. Beginning in 2000, the project diagnosed the contamination of the entire urban area of Santo Amaro and broadened the research on contamination at the premises of Plumbum (ANJOS; SÁNCHEZ, 2001).

Barragem de escória contaminada

In addition, it has suggested several mitigation measures, such as the preparation of a remediation plan for the urban area of the municipality, including: definition of the priority intervention areas, estimate on the amount of slag disposed of in the city, action plan, and cost forecast. The project has recommended topsoil scraping to remove slag deposited randomly around the plant as well as topsoil that was most impacted, and subsequent treatment to separate the slag from the soil. It has also suggested that the contaminated soil should be used for the manufacture of tiles and ceramic blocks – once the process has demonstrated high capacity of pollutant immobilization and involves low cost - and has recommended that, until the topsoil and slag removal have been completed, the floodplain area should be left untouched (PROJETO PURIFICA, 2003).

This floodplain area (or wetland), situated downstream of the main slag barrier and about 90 meters long, originated in a rainwater landfill of the enterprise and has been shown to be effective for the control of contamination of surface water since it retains the vast majority of heavy metals (ANJOS, 2003).

In 2004, the risks of contamination by air were lower in the urban area of Santo Amaro for almost all the points of lead slag release had been covered with cobblestone or asphalt. "The weatherproofing promoted by this type of coverage decreases infiltration of rainwaters into the soil, reducing leaching of the deposited slag and spreading and dragging of polluting particles by the wind. However, this residue is from time to time brought to the surface by repair services in the water and sewage systems, or the installation of ducts, thus reactivating several routes of contamination" (MACHADO et al., 2004, p. 142).

Over the years, several analyses have been performed for characterization of lead and other heavy metals in the metallurgical waste in Santo Amaro (LIMA; BERNARDEZ, 2010, 2011a and 2011b) and, until 2010, approximately 500,000 tons of slag were in the company property, without proper encapsulation (ALCÂNTARA, 2010). Many of the former employees had occupational diseases, receiving only retirement or sickness-support allowances from the National Social Security Institute (INSS). Although the company had paid some compensation, there were still "some two thousand individual cases processed in the Regional Labor Office of Santo Amaro. And, with regard to the environmental damage, nothing has been done" (ALCÂNTARA, 2010, p. 109). It is worth mentioning that a recent research conducted from the slag samples diverges from the one previously held in Santo Amaro for considering that it is not a source of contamination (LIMA; BERNARDEZ, 2010, 2011a e 2011b).

Regardless of what the pathways of contamination are, experts warn that the municipality of Santo Amaro not only needs an environmental management plan but also effective communication and risk governance, which enable a participatory dialogue with the affected communities and data dissemination for media and government bodies (DI GIULIO et al., 2010). In turn, on May 26, 2011, the President of the Republic Dilma Rousseff determined measures to the Government for the resolution of the municipality's liabilities (AGÊNCIA SENADO, 2011).

"Santo Amaro is considered one of the most lead-polluted cities in the world. In the world literature, it is a reference case on the study of contamination by lead and cadmium" (ALCÂNTARA, 2010, p.114).

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