

Nuclear

Keywords

- > Uranium mining
- > Radioactivity
- > Health risks
- > Caetité / Brazil
- > Science-led activism

The project

Since 2000, state-owned Nuclear Industries of Brazil (INB) has been exploring uranium ore in Caetité, a municipality in the semi-arid region of Bahia, Brazil. The only operational mine in Brazil, the Caetité mine aims to provide fuel for two Brazilian nuclear power plants. The amount of uranium ore is estimated at 100,000 tons and annual production capacity of uranium concentrate (also known as yellow cake) is nearly 400 tons (MME/EPE, 2007).

The uranium is extracted from the ground by open pit mining and removed by heap leaching. First the ore is crushed, heaped, and then irrigated with a sulphuric acid solution to remove the uranium. Next, the uranium concentrate is made by the process of solvents extraction, followed by separation by precipitation and drying. Finally the uranium oxide or uranium concentrate is packaged in drums to be sent to Europe for conversion and enrichment.

INB's major shareholder is the Nuclear Energy National Commission (CNEN), which is the Brazilian regulatory agency for nuclear energy. In Brazil, CNEN is also responsible for regulating and promoting nuclear energy activities.

The city of Caetité has about 47,000 inhabitants and is situated in the southwest part of Bahia, nearly 760 kilometres (472 miles) from its capital Salvador. The mine is located 40 kilometres (25 miles) from downtown Caetité, in Lagoa Real, and surrounded by small farming communities.

The conflict

Since the mine became operational, Caetité's civil society has organised several demonstrations to express concerns about health and environmental risks and impacts related to INB's activities. The main local environmental justice organisations (EJOs) that contest the actions of the mine company in the city are the Environmental Parish Commission (a religious organisation linked to the local



Uranium concentration unit in Caetité
Photo by INB (inb.gov.br)

Catholic Church) and the Paulo Jackson Movement Association – Ethics, Justice and Citizenship.

In Caetité, the risks and uncertainties related to uranium mining and milling are at the heart of the conflict. The population affected by the Project argues that there is a lack of adequate information regarding human exposure to different levels of radioactivity and possible health effects (e.g. cancer). This lack of information generates distrust and fear among the population, which is justified not only because the subject of radioactivity has negative repercussions in society in general, but also due to factors such as suspicions of environmental contamination (air, soil, water) by radioactive material; administrative and operational irregularities in the mine; workplace accidents and radioactive waste leakage into the environment; absence of a centre for diagnosis, treatment and control of cancer in Caetité, et cetera.

According by Zoraide Vilasboas (2009), the main representative of the Paulo Jackson Movement Association, there are several factors that support the suspicions fostered by local EJOs in relation to the “*scientific and technical competence of the company to deal with extremely complex activities—such as mining, milling and transportation of nuclear material—and high risks to human beings and the environment*”. In addition to the potential contamination of groundwater, Vilasboas mentions problems such as the seven times the tailings retention basin spilled over in 2004, releasing highly radioactive





Brazilian uranium reserves
Source: INB (inb.gov.br)



Blockade to prevent radioactive load from São Paulo from entering Caetité
Source: Novembro Amarelo (<http://tinyurl.com/ox32ndj>)



Protest against entrance of radioactive load from São Paulo to Caetité
Source: Novembro Amarelo (<http://tinyurl.com/pbpq8d8>)

material, with concentrations of uranium-238 and radium-226 to the environment. Yet, many doubts still remain about the extent and consequences of such events.

In October 2008, a report by Greenpeace Brazil called “Hazard Cycle” (*Ciclo do Perigo*) denounced the radionuclide contamination in two water wells used for human supply in Caetité, linking it to mining activities. This triggered federal prosecutors in Bahia to demand a public hearing for further clarification, and an independent investigation to ascertain the facts. The Bahia Institute of Water Management and Climate (*Instituto de Gestão das Águas e do Clima – Ingá*)—renamed the Institute of Environment and Water Resources (*Instituto do Meio Ambiente e Recursos Hídricos – Inema*) in 2011—also collected and analysed water samples to assess whether the site was contaminated, and found that radioactive material in some samples was above the levels allowed in Brazil (according to Federal Resolution CONAMA 357/05). Although Ingá ordered the closure of several wells that were used for human consumption, it is still necessary to conduct further research to actually prove whether the contamination is related to the activities of the mining company and, if so, to what extent.

The wells suspected of contamination, initially pointed out by Greenpeace Brazil and confirmed by Ingá, corroborate the concerns of local EJOs on the risks and impacts of uranium mining and milling. The INB, in turn, denies that its activities caused contamination, stating that it adheres to existing rules and regulations to prevent and minimise health and environmental impacts in the vicinity of the mine. In relation to possible water contamination, the company asserts that it periodically conducts tests to evaluate water quality, and consistently monitors and logs all the collected information in a specific database. EJOs, however, claim that water quality data has never been made public.

In efforts to deny its responsibility with regards to possible environmental

contamination, the INB argues that the local soil has high levels of natural uranium concentration. It also claims that at these levels, the uranium concentration in the groundwater would not harm human health. Naturally, this statement contradicts the views of the local people, who fear for their health and are concerned about a possible increase in the incidence of cancer cases in the region.

According to Vilasboas (2009), besides mine workers, people who live in the vicinity of the mine—mostly small farmer communities and some *Quilombolas* groups—are the most vulnerable to the risks and effects of uranium mining and milling, since they are “*more directly affected by the release of radon into the atmosphere and the dust generated in the process*”. It should also be noted that these communities do not have access to the public water supply; therefore, they rely on groundwater wells or dams to meet their water demands—which might be contaminated by radionuclides, as already mentioned.

Communities near the mine are also facing a process of stigmatisation. Due to the risks of radioactive contamination, they are unable to sell their products (vegetables, fruits, milk etc.) in downtown Caetité. Since no one in the city wants to consume their products, they exchange it among themselves, which may increase their exposure to radioactivity.



2000	Mine operations begin
2000	5,000 cubic metres of uranium oxide leaks from the mine facilities, is reported six months later and demystified only after more than three months (Apr.)
2002	Leakage in Area 170 kept secret, which may have possibly contaminated the groundwater (Apr.)
2004	The retention basin of "thin material" overflows seven times, releasing liquid concentration of uranium-238 and radium-226 to the environment, causing fish mortality in nearby lakes
2006	Disruption in one of the geotextiles in the uranium liquor basin results in a 60-day-stoppage
2008	Reports of leaks at the leaching tanks (June)
2011	Human blockade to prevent an unknown radioactive load from São Paulo from entering Caetité to be stored in the mine's facilities (May 15)

Chronology of major events
Adapted from Greenpeace (2008) and Lisboa et al. (2011)

Environmental justice mobilisations

On 15 May 2011, a huge anti-INB demonstration was held in Caetité: some 3,000 people organised a human blockade to prevent 13 trucks full of unknown radioactive material from São Paulo from being stored at the mine's facilities. Local EJOs demanded an explanation from the authorities, but none could offer a plausible one. On its website, INB stated that the material consisted of a uranium compound, originating from the Navy's Technological Centre in São Paulo. It was meant to be repackaged in Caetité and sent to Europe for enrichment.

After negotiations, a Provisory Institutional Commission was created to monitor the management of the radioactive material. This commission included representatives of local EJOs, the INB and the authorities. It was agreed that the material would be stored at the mine's facilities for repackaging. Nevertheless, certain doubts and uncertainties concerning this material still remain unanswered.

During the protests in May 2011, Father Osvaldino Barbosa from the Diocese of Caetité and the Environmental Parish Commission received anonymous death threats by telephone, warning him to stop denouncing problems related to uranium mining in Caetité. Undeterred, he continued his work and presently, the threats seem to have ceased.

After the blockade, some mine workers decided to strengthen their collaboration with local EJOs. They began to condemn INB's threats to dismiss employees who revealed what went on in the mining facilities and harassment of employees politically active in the regional mine workers' union. They also complained that the results of a survey

on workers' health conditions had not been made public.

INB's denial of risks

To sustain and legitimise its arguments to deny the risks caused by uranium mining in Caetité, the INB uses advertising mechanisms, as may be seen on its website (www.inb.gov.br). It cites, for instance, the following newsletter article on Caetité, from June 2009: "Scientific research proves uranium mining did not increase cancer cases" (Daqui, 2009). The "scientific research", called "Epidemiological Study of Morbidity and Mortality Related to Possible Occurrence of Diseases Related to Genetic Damage and Malignant Neoplasm in the Area of Influence of the Uranium Concentrate Unit (URA) of the Nuclear Industries of Brazil (INB)—Caetité, Bahia state", was funded by the INB and carried out by a group of researchers from the Oswaldo Cruz Foundation (Fiocruz), a prestigious Brazilian research institute in public health. Nonetheless, local EJOs refute the conclusions of the study, since it is based on an analysis of secondary data (Mortality Information System of the Brazilian Ministry of Health) and the

More on this case

- Map of Environmental Injustice and Health in Brazil
conflitoambiental.icict.fiocruz.br/index.php?pag=ficha&cod=29

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Protest against expansion of Brazilian nuclear program. Salvador, Bahia

Source: Paulo Jackson Movement Association, April 2009



EJOLT workshop on environmental justice, uranium mining and community monitoring of radioactivity

Source: EJOLT, June 2012



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percentage of deaths with ill-defined causes for Caetité is above 30 percent (between 2005 and 2007), which raises doubts concerning the quality the database. In addition, the latency period for some diseases like cancer can be more than 15 years from the time of exposure—and the mine became operational only in 2000.

Local EJOs still demand an epidemiological investigation be conducted in Caetité by some competent institution without ties to the INB, to evaluate a possible association between exposure to ionising radiation and cancer incidence among the population.

This demand has yet to be met; thus for the present, Father Osvaldino Barbosa uses his influence in the local parish and tries to collect as much evidence as possible, about the cases of death by cancer within communities that constitute the local diocese, to undermine the INB's official discourse of denial about the risks to public health. He has begun to compile an alternative health database. In a way, this process may be seen as popular epidemiology. However, although he is aware of the importance of his investigative work, he finds it too limited because it is not "scientifically" based

Science-led activism in Caetité

Since 2011, local EJOs and another research group from Fiocruz (member of EJOLT) have begun to collaborate in Caetité. Their objective is to provide "counter expertise" and organise the data local communities generate on environmental risks and health problems in a way that may initiate a process of popular epidemiology, to investigate the distribution of disease (esp. cancer) in the areas most affected by uranium mining. To this end, an EJOLT Workshop on Environmental Justice, Uranium Mining and Community Monitoring of Radioactivity was held in Caetité in June 2012. It aimed to discuss environmental justice, health and grassroots participation in the context of uranium mining.

Besides local communities and Fiocruz, other EJOLT partners also took part in the event, such as CRIIRAD, France; Earthlife Namibia; Focus, Slovenia; Za Zemiata, Bulgaria; and Acción Ecológica, Ecuador. The workshop included training on community monitoring of radioactivity for local people, and a toxic tour through the areas affected by mine operations. In addition, the author of this factsheet is working towards completing a PhD on public health, with research focusing on the process of understanding the health and environmental risks related to uranium mining in Caetité.

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