



Brazil is part of the small group of countries that accepted the challenge of implementing remediation in Antarctic soil

Brazil has intensified environmental monitoring research in Antarctica since 2002, when the Ministry of Environment (MMA) prompted the Project of Environmental Change in Antarctica through two research networks: one studying global impacts and the other the local impacts in the area of the Comandante Ferraz Antarctic Station - EACF.

After a fire at the Station in early 2012, monitoring of the affected area to check the level and extent of hydrocarbon contamination from the use of diesel fuel for power generation in the station was established. This monitoring is being carried out by researchers from the Oceanographic Institute of the University of São Paulo (IOUSP), by experts from the Environmental Company of the State of São Paulo - CETESB and IBAMA from soil samples, sediment, moss and algae in annual campaigns of soil contamination research.

Based on the results of contamination encountered, a remediation plan has been defined for the area, in order to mitigate or eliminate any pollution of the soil and prepare it for the reconstruction of EACF. From the experience gained by previous studies, a Bioremediation Program of the area contaminated with hydrocarbons began.

With the application of bioremediation technique, it is intended to stimulate the

microorganisms present in the soil affected by the supply of nutrients that are naturally in low concentrations in Antarctic soil (typically nitrogen and phosphorus) so that they consume carbon of the hydrocarbons to obtain energy. After the microbial attack, this carbon ends up being released into the atmosphere as CO₂, as a product of microbial respiration. Therefore, the soil containing hydrocarbon needs to be removed, homogenized with the presence of fertilizers and stored in an isolated environment so that a process of degradation of pollutants occurs in a technique known as "Biopile".

The Remediation Program of the EACF's soil began in the Antarctic 2013-2014 summer, where the knowledge generated by the research has been applied. The institutions involved in this work is the Brazilian Navy, through the EACF Group Base and Brazilian Marines Engineering Battalion, MMA, through the Biodiversity and Forests Department, the UFSJ (Federal University of Sao Joao del Rei), USP and CETESB.

In addition to the continuity and improvement of the implementation of engineering and design of Biopile and the monitoring of hydrocarbon degradation efficiency, there are also plans for:

- Selecting bacteria from EACF's soil, which are able to degrade diesel oil and can be grown and multiplied in laboratories to be applied in greater numbers of Biopile;

- more efficient selection of fertilizer to the conditions presented by the EACF's soil; and

- developing an emergency action to be applied in the event of new leaks, where procedures will be provided for the proper collection of contaminated soil, which will be put in appropriate places. Fertilizers and degrading bacteria will be used immediately, so that soil can be decontaminated.

This work was observed by representatives from the United Kingdom and the Czech Republic on January 9 while carrying out technical inspections of the Emergency Antarctic Modules and in the area of EACF, as provided in the Environmental Protection Protocol (Madrid Protocol) of the Antarctic Treaty.

With this important program, Brazil, as well as Australia and Argentina, became part of the select group of countries that accepted the challenge of implementing remediation projects in the Antarctic soil. An exchange of experience initiatives between these countries are already underway and is expected to thereby enhance the techniques used and achieve the greater goal—to minimize the environmental impacts of human presence in Antarctica.

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PHASE 1:

- Due to an expected start up in the EACF's reconstruction works in the first intervention, in January 2014, the soil contaminated with hydrocarbons where there was the former engine room was treated at the location. Thus, the technique chosen for this procedure was the "biocava", which consisted of "packaging" and aerating the mixture of contaminated soil and fertilizer, using high density polyethylene membrane (HDPE) of 2 mm in thickness.

Photo: installation of Biocava's aeration network



PHASE 2:

- In the second phase of remediation that took place earlier this year, the intervention occurred in the area between the treated area in the first phase and the shoreline. Conventional biopile was used where contaminated material was removed and, after being mixed with fertilizer, deposited in an area already impacted previously prepared for this purpose. The mixture will be stored in biopile until the soil is completely free of contamination or hydrocarbon levels are low.



An English representative observes the process of soil bioremediation during the technical inspection Photo: Lt. Quineper



Oceanographic Support Ship Ary Rongel during the XXXIII Antarctic Operation

Photo: Cesar Fraga

