

ENVIRONMENTAL EFFECTS IN A SUBTROPICAL BRAZILIAN RIVER AFTER AN OIL SPILL

Bias Marçal de Faria - PETROBRAS Research and Development Center - Cidade Universitária Q. 7 - Ilha do Fundão - Rio de Janeiro - RJ - CEP: 21949-900 - Brazil - biasfaria@petrobras.com.br
Mário César Timmerman - TRANSPETRO Southern Region - Rua Felipe Musse, 803 - Ubatuba - São Francisco do Sul - SC - CEP 89242-000 - Brazil - marioc@petrobras.com.br
Eduardo Barcellos Platte - PETROBRAS Research and Development Center - Cidade Universitária Q. 7 - Ilha do Fundão - Rio de Janeiro - RJ - CEP: 21949-900 - Brazil - platte@petrobras.com.br
Mário do Rosário - PETROBRAS Research and Development Center - Cidade Universitária Q. 7 - Ilha do Fundão - Rio de Janeiro - RJ - CEP: 21949-900 - Brazil - marioros@cenpes.petrobras.com.br

ABSTRACT

Part of the production of the Refinery Getúlio Vargas (Paraná State, South Brazil), is transported through OLAPA Pipeline to a Marine Terminal in Paranaguá. In February/2001 occurred a displacement of a great amount of land which caused abrupt rupture of the pipeline in km 57, and 57.000 liters of diesel oil was spilled. Despite all efforts of PETROBRAS contingency team, the oil spilled reached 3 rivers (Meio River, Sagrado River and Nhundiaquara River) and ending at the sea in Antonina Bay. Right after the incident, a monitoring program was established to evaluate short term effects. One year after the incident, long term effects were also evaluated, especially concerning benthic community and ecotoxicology on the rivers affected by the spill, and plant and birds community in region on its influence.

The results point short term effects on water chemistry, but those lasted no more than one week. Short and long term effects on birds and benthic community were not detected.

INTRODUCTION

The state of Paraná is located in southern region of Brazil. PETROBRAS has a refinery with capacity of about 200.000 bopd located in the city of Araucária, in the metropolitan region of Curitiba, the capital of Parana State.

Part of the products from this refinery are transported through OLAPA Pipeline to a Marine Terminal in Paranaguá City and there to other regions of Brazil by tankers. The region along the OLAPA pipeline is the mountain ridge called "Serra do Mar" which is a Hot Spot of the Atlantic Rain Forest biome.

In february 16th 2003 occurred a displacement of a great amount of land which caused the rupture of the pipeline in km 57. The rupture was abrupt and caused an diesel oil spill of 57.000 liters. This oil was destined to Paranagua Terminal to be mixed with fuel oil for production of Marine Fuel. At that location the pipeline was buried about 3 meters depth. The spilled oil came to surface and follow down through the pluvial drainage reaching 3 rivers (Meio River, Sagrado River and Nhundiaquara River) and ending at the sea in Paranaguá Bay.

The detection of the leakage was done in a very short time by a PETROBRAS overseer which was monitoring that area. The

PETROBRAS emergency plan was immediately put into action and, as a consequence, the pipeline valves upstream and downstream the rupture point were closed and the resources to contain and collect the spilled oil were displaced to several places along the rivers affected by the accident.

SAMPLING

After the communication of the spill, a PETROBRAS Research and Development Center (CENPES) team conducted a monitoring program, with participation of local authorities and researchers from different universities in Brazil. The initial focus of this monitoring program was water and sediment chemistry and samples for this purpose were collected in different sites along the rivers and Paranaguá Bay (figure 1).

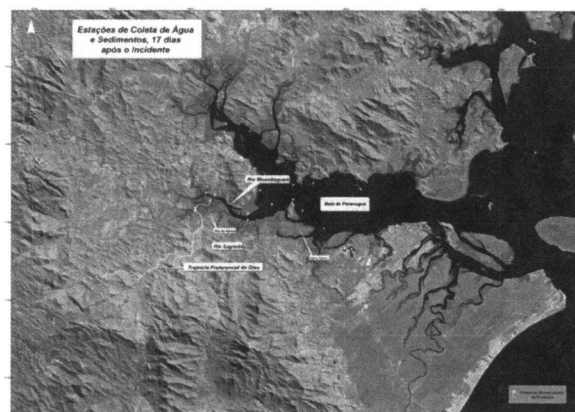


FIGURE 1 – LOCATION OF WATER AND SEDIMENT SAMPLING STATIONS ON OIL SPILL SITE.

At the same time biologists carried on daily observations on bird community, during 2 weeks, on the rivers and its surroundings.

One year later, intending to observe long term effects, another screening was conducted, including at this time analysis on benthic community.

DISCUSSION

According Meniconi & Gabardo (2001), polycyclic aromatic hydrocarbons (PAHs) concentrations ranged in a gradient from the spill spot to the bay, decreasing from 1416.0 to 1.6µg/l (average values for the 1st week after the spill). 3 weeks after the spill, the PAHs concentrations decreased in a range from 469.2 to 0.4µg/l (FUNDESPA, 2001). Sediment PAHs concentrations ranged from 86666,3 to 3,9 µg/Kg 3 weeks after the spill (FUNDESPA, 2001).

Thirty seven different species of birds were registered in the two periods of observations, with small differences on community richness between the two periods, probably related to natural seasonal changes (Scherer-Neto *et al.*, 2002).

The benthic community along the affected are changed on its composition, specially related to the salinity, water flow and sediment characteristics. Significant differences between stations in and out of the area affected were not detected on composition of this community. (Callisto *et al.*, 2002).

CONCLUSIONS

The oil spill effects were clearly detected only on the 1st week after the incident. The high water flow, characteristic of mountain-ridge rivers, contributed for the mitigation on the environmental impacts, which were not detected after one year.

Assuming the benthic community as the best indicator for chemical impacts on rivers, we can state the no long term effects occurred on this oil spill.

BIOGRAPHY

The first author is B.S. in Marine Biology, MSc in Environmental Geochemistry and PhD in Environmental Biophysics at the Federal University of Rio de Janeiro, Brazil (including 2 years of fellowship at Lund University, Sweden). The author has 15 years of scientific and professional experience in Limnology, occupying the mandate as 1st secretary of the Brazilian Society of Limnology. He works since 2001 as a Researcher for PETROBRAS Research & Development Center (CENPES).

REFERENCES

- Callisto, M.; Gonçalves, J.F.; Moreno, P.M.; Goulart, M.; Ferreira, W.F. & Moretti, M.—Avaliação das comunidades de macroinvertebrados bentônicos dos rios do Meio e Sagrado/Morretes, PR—Technical Report—July 2002—73p.
- FUNDESPA—Avaliação de potenciais impactos ambientais na bafa de Antonina e rios atingidos pelo vazamento de óleo decorrente do rompimento do OLAPA—Technical Report—July, 2001—43p.
- Meniconi, M.F.G & Gabardo, I.T.— *PETROBRAS Internal Report QM 048/01*—May 2001—33p.
- Scherer-Neto, P.; Carrano, E. & Ribas, C.F.—Diagnóstico da Avifauna da Região Estuarina da Baía de Antonina, Paraná—Technical Report—September 2002—62p.