

2000-2003 Environmental Assessment of PAHs Emissions and Monitoring at the Copesul/South Petrochemical Complex located in Southern Brazil.

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COPESUL is the Raw Material and Utilities Central of the South Petrochemical Complex, this, being the most modern industrial facility of its type in Brazil (city of Triunfo, state of Rio Grande do Sul), and the second largest naphtha cracker in the country. Responsible for more than 40% of Brazilian olefins production, it is also among the largest crackers (on the same site) in the world. At the request of the state of Rio Grande do Sul's Environmental Protection Agency (*Fundação Estadual de Proteção Ambiental Henrique Luís Roessler/RS* or *FEPAM*), an Environmental Assessment of Priority Pollutants (EAPP) has been performed at the Petrochemical Complex since 1997, on a basis of once every three year. Prior to 97, EAPPs were conducted by Copesul, but on a voluntary basis. Among the different (organic and inorganic) parameters tested, VOCs/SVOCs (including PAHs) remains the main focus with regards to the Complex activities and of it's potential impact on the human health and the environment. On the year 2000, Copesul, SNCwLavalin Environment and FEPAM all agreed on the methodologies to be used for that year's Environmental Assessment of Priority Pollutants of the South Petrochemical Complex (105 sampling points for PAHs). This marked the beginning of SNC-Lavalin's involvement in this project. It included a international survey to recommend environmental guidelines that were to be used to assess the site conditions, considering that Brazil has not yet adopted nor established site assessment guidelines. Following the year 2000 campaign, a new campaign was conducted in 2003 (reduced to 60 sampling points for PAHs). All laboratory analyses (2000/2003) were performed in Canada.

The EAPPs of 2000 and 2003 concluded that of the 2 targeted and investigated potential emission sources of PAHs (treated waste water and resulting sewage sludge) of the Petrochemical Complex, only the sewage sludge could be regarded as a significant source of PAHs release to the environment (through land-application). However, the potential impact of this sludge remains under control, as indicated by monitoring of the potentially impacted matrices (soil, surface and groundwater surrounding the sludge farm).

Along the same trend, none of the environmental matrices monitored for PAHs (5 of them in 2000 and 4 in 2003), for sampling points outside and/or downstream of the Complex showed significant presence of these pollutants. However some environmental guidelines exceedances were identified for some PAHs compounds inside the Complex : surface water from safety basin no 7 (one of the three safety basins that receive rainwater that are collected in non process areas of the petrochemical complex) (2000) , soils from sewage sludge farm (2000/2003) and sediments from waste water treatment lagoon no 1 (2000/2003) and no 8 (final polishing lagoons of treated effluent) (2000) and of safety basins no 3 (2000/2003), no 4 (2003) and no 7 (2003), and finally from Basin of Santa Clara Terminal (river ship terminal) (2003). The analytical PAHs chemical profiles: of the Complex sewage sludge, of the soils being used for sludge application, and of the sediments in the treatment lagoon no 1, are all very similar to the profile of the raw effluents/influent of the Complex, confirming their origins. However, chemical profile of the safety basins are significantly different than of the above-mentioned, possibly indicating other contamination sources/routes. Finally, low trace presence of PAHs in final treated liquid effluent of the Complex is an indication of the quality performance of the waste water treatment facility at the Complex.

Recommendations of 2003 Priority Pollutants Assessment are: 1) to continue this current monitoring program (once every three years) but with some minor adjustments, as, for instance, the inclusion of ambient air quality sampling in every other campaign, 2) data collected also shows irregularities of sewage sludge application rate (on soils) on some sludge farm areas that should be confirmed and corrected, if needed. 3) Fresh water sediments PAHs exceedances of selected criteria should be better understood, through a thorough audit of operational conditions and complementary sampling/testing of safety basins aiming to search for unknown and possible contaminations sources/routes, and also to verify if the selected Canadian environmental guidelines are appropriate to the local environment.