



**HAL**  
open science

## Effect of remediation treatments on Polar PACs in soils : degradation vs. formation

Stéfan Colombano, Sitraka Andriatsihoarana, Salma Ouali, Coralie Biache,  
Catherine Lorgeoux, Aurélie Cebron, Alain Saada, Bruno Lemiere, Pierre  
Faure

### ► To cite this version:

Stéfan Colombano, Sitraka Andriatsihoarana, Salma Ouali, Coralie Biache, Catherine Lorgeoux, et al.. Effect of remediation treatments on Polar PACs in soils : degradation vs. formation. International Symposium on Polycyclic Aromatic Compounds conference, ISPAC 2015, Sep 2015, Bordeaux, France. hal-01188563

**HAL Id: hal-01188563**

**<https://brgm.hal.science/hal-01188563>**

Submitted on 31 Aug 2015

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

## EFFECT OF REMEDIATION TREATMENTS ON POLAR PACS IN SOILS: DEGRADATION VS. FORMATION

Stéfan Colombano<sup>1</sup>, Sitraka Andriatsihoarana<sup>2,3,4,5</sup>, Salma Ouali<sup>2,3,4,5</sup>, Coralie Biache<sup>2,3</sup>, Catherine Lorgeoux<sup>4,5</sup>, Aurélie Cebbron<sup>2,3</sup>, Alain Saada<sup>1</sup>, Bruno Lemièrre<sup>1</sup> and Pierre Faure<sup>2,3</sup>

<sup>1</sup> BRGM, Orléans, 45060, France

<sup>2</sup> Université de Lorraine, LIEC UMR 7360, Vandœuvre-lès-Nancy, 54506, France

<sup>3</sup> CNRS, LIEC UMR 7360, Vandœuvre-lès-Nancy, 54506, France

<sup>4</sup> Université de Lorraine, GeoRessources UMR 7359, Vandœuvre-lès-Nancy, 54506, France

<sup>5</sup> CNRS, GeoRessources UMR 7359, Vandœuvre-lès-Nancy, 54506, France

The evaluation of the efficiency of remediation processes (thermal desorption, ISCO, bioremediation...) of PAH polluted soil is generally based on the measurement of specific parameters (*i.e.* 16 PAH US-EPA). Such limited characterisations do not allow evaluating the potential formation of organic by-products (especially Polycyclic Aromatic Compounds - PAC).

Different remediation treatments, most commonly used and that may be the most problematic regarding O-PAH production, have been applied to three representatives PAH contaminated soils (former gasworks, coke oven plants and wood preservation facilities soils). These treatments include chemical oxidation (hydroperoxyde oxidation (H<sub>2</sub>O<sub>2</sub>), Fenton like oxidation using magnetite as catalyst and permanganate (MnO<sub>4</sub><sup>-</sup>)) and biological treatment.

The experimental results with chemical treatment show that the polar oxy-PAHs were removed more slowly than the PAHs in all chemical treatments, indicating that O-PACs were simultaneously generated during the oxidation (especially for permanganate treatment). The effect was most obvious when considering the PAC contribution to the total Extractable Organic Matter (EOM).

The microbiological treatment performed on these soils shows a removal of PAHs with a removal rates controlled by the availability of the pollution. Polar PACs remediation followed the same trends as the PAHs in the coke oven soils and the gasworks soil. However, in the wood preservation soil, the removal rates of the polar PACs were significantly lower than of the PAHs suggesting a simultaneous formation of polar PACs as a result of the extensive transformation of PAHs in this soil.

**Keywords:** Polycyclic Aromatic Compounds, chemical oxidation, microbiological treatment, byproducts