

## Background

Exploratory measurement campaign was conducted from March 2015 to June 2016 to acquire data about exposure of Paris sewer workers to biological pollutants. The results completed previous measurement campaign on chemical pollutants. The aim was to provide useful data to the group experts so as to guide any prevention measures and protection means.

## Methodology

A research and development agreement was signed between the French agency for food, environmental and occupational health and safety (ANSES) and the Ile de France health insurance fund (Cramif) to realize the measures with the participation of the sewer teams of the city of Paris.

### 8 TASKS

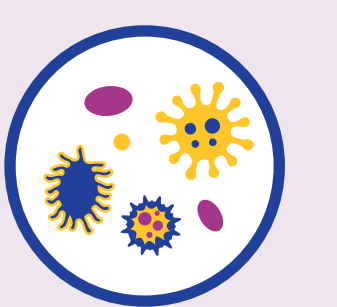
- Collection of information
- HP cleaning pre-treatment wastewater installations
- Boat-valve cleaning
- Waggon-valve cleaning
- HP cleaning of machinery
- Extraction from sand trap
- Small line HP cleaning - separator network
- Small line HP cleaning - unitary network

### 3 MEASURES /TASK



#### Personal samples (breathing zone)

- Every worker of the team: at least 2 operators + 1 supervisor



#### Ambient samples (at breathing zone height)

- Control sample

#### Pollutants

- Airborne endotoxins, cultivable microbial flora, identification of *Aspergillus flavus*

**Work observation and activity record:** Task performed & detailed description, Location, Network characteristics, Temp. ° C / Meteorology, Sector survey, Tools used, PPE, Incidents, etc.

Protocols: INRS - MetroPol sheets 154 - 147, samples were stored at 4°C until analysis carried out within 24h.



## CHARACTERISATION OF PARIS SEWER WORKERS' EXPOSURE TO BIOLOGICAL POLLUTANTS OBSERVATIONS AND RECOMMENDATIONS

Example of assistance by Biocontaminants Laboratory (LBC) of Cramif

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## Results and conclusions



- Sewer workers exposed to bioaerosols, both **endotoxins and microorganisms** (including *A. flavus*).

- Existence of particularly exposing tasks: extraction work from sand trap and high-pressure cleaning.

- Highest levels:

- **Endotoxins: 2,875 UE/m<sup>3</sup>** - HP cleaning of machinery (boat-valve)

- **Bacteria: 1.78 x10<sup>6</sup> UFC/m<sup>3</sup>** - Extraction from sand trap



- Exposition to biological contaminants through **inhalation, contact and ingestion** (in particular for all tasks generating aerosols).

- Health effects potentially related to endotoxin concentrations (acute effects and some chronic respiratory effects).

- Aflatoxin B1 potentially present in the air of sewers.

- Protection means essential for all exposing tasks.

- Wastewater networks environment particularly unhealthy, as already been noted in previous work on exposure to chemical pollutants (published in June 2016). Multiple pollutants: chemical and biological agents.

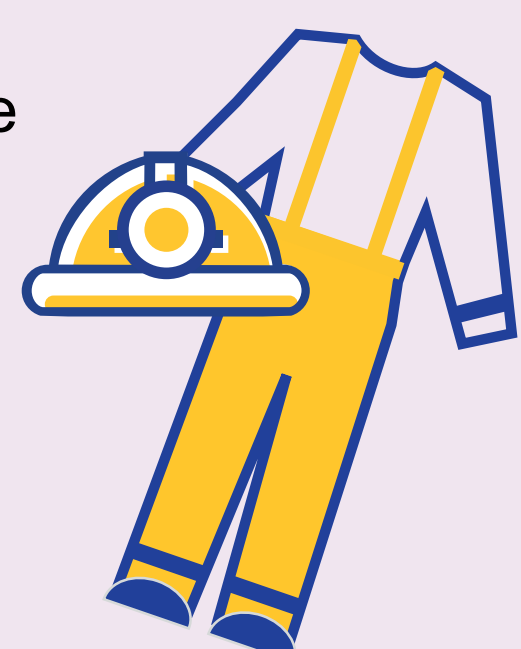
- Existence of additional health risk factors for sewer workers.

## ANSES's recommendations



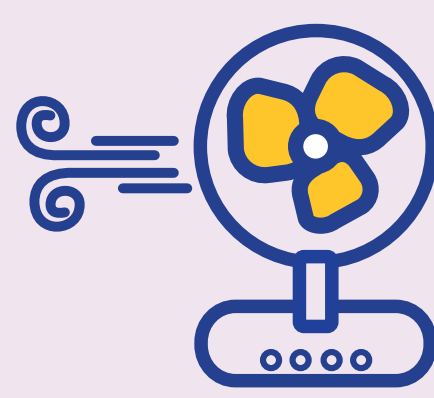
### Occupational hazard prevention approach

- Consider biological risks in the assessment of risk related to sewage activities.
- Analyse the different work situations to prioritise and adapt the preventive measures.



### Practices

- Harmonisation of practices with common reference of good hygiene and prevention practices. Inclusion in service provider specifications and assessing compliance on the ground.
- Technical measures for accessibility and mechanical ventilation in confined areas (at least natural ventilation before entry). Include elements relating to ventilation in prevention plans.



### Organisational measures:

reduce the workers' exposure:

- Avoid concurrent work in the same drainage network (Better coordination),
- Increase the frequency of cleaning
- Rotation of the teams
- Provide of a device with integrated shower and spare clothing (for accidental exposures)



### General recommendation:

- Make construction professionals aware of the impact of their discharges to sewers (building waste) that increase the risk to sewer workers.

