

## EXPERTISE SERVICES

# Health Risk Assessment (HRA)

NUMTECH estimates the consequences on the health of populations exposed to chemical substances through the methodology of health risk assessment, commonly used in France and abroad.

### Definition

Health risk assessment is a risk management support tool. It aims to describe as accurately as possible the consequences on the health of populations who may be exposed to chemical substances. It involves using the best available scientific data and appropriate assumptions based on current scientific knowledge.



### Areas of application

- Production and/or processing industries (chemical industries, refineries).
- Thermal power plants.
- Waste valuation or storage units.
- Oil storage facilities.
- Road infrastructures.
- Geographic areas taking into account all possible emission sources (industrial areas, road traffic, urban heating).

### Advice provided by specialists

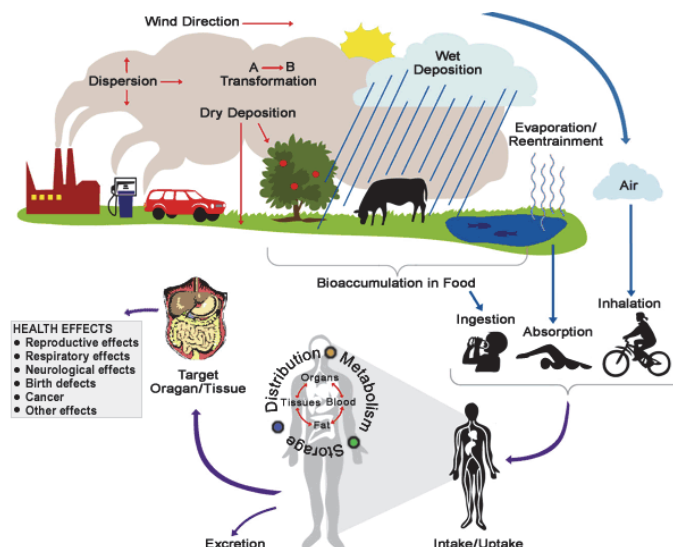
- Apprehension of the specificities of the environmental context and the degree of criticality of the study.
- Continuous scientific and regulatory monitoring.
- Technical support to the project sponsor: from the hypothesis formulation to the results presented to local authorities and/or to the general public.

### A robust, tried and tested methodology

The content of the health risk assessment is defined by a regulatory framework, general guidelines and business sectors guides (waste disposal and storage facilities, industrial facilities, refineries, quarries, wastewater treatment plants, sludge spreading, road infrastructures, livestock farming, and polluted sites).

Human health risk assessment includes 4 basic steps:

- Step 1: Hazard Identification,
- Step 2: Dose-Response Assessment,
- Step 3: Exposure Assessment,
- Step 4: Risk Characterization.



Conceptual scheme of exposure used in step 3 of HRA approach.



## References

- Types of sites: asphalt plants, crematoriums, biogas plants, road development, diesel-powered stations, waste storage facilities, thermal power plants, etc.
- Customers: EDF, ROCKWOOL, PÖYRY ENERGY, GIRUS, FONROCHE, DREAL PACA, AIR PACA, CHATAL, AMCOR, ATRIUM, MAKHTESHIM AGAN FRANCE, CRISTAL, CEA CADARACHE, CONSEIL GENERAL DES HAUTS-DE-SEINE, etc.



## The key steps of the Health Risk Assessment methodology

### Step 1: Hazard Identification

The aim is to determine how exposure to a given agent could cause harmful effects, and identify the nature of these effects.

All harmful agents for human health can be taken into account up to the limits of current knowledge:

- Chemical agents (trace elements, VOC, PM10 or PM2.5 dust, sulphur dioxide, nitrogen dioxide, carbon monoxide, PAH, dioxins, furans and polychlorinated biphenyls (PCB), pesticides, etc.).
- Biological agents (legionella).
- Physical agents (noise, radiation, electromagnetic waves).

### Step 2: Dose-Response Assessment

This step estimates the relation between the dosage of an agent coming into contact with the organism and the observable incidence of an effect, deemed critical for this organism. There is a specific relationship for each individual route of exposure (respiratory, digestive, cutaneous).

The databases used are the following: INERIS, ANSES, US-EPA, ATSDR, WHO, Health Canada, RIVM and OEHHA. This step includes a critical TRV (toxicological reference value) analysis to support the confidence levels assigned to the results.

### Step 3: Exposure Assessment

This step allows to estimate the level of environmental contamination to which populations may be exposed and quantify populations exposure.

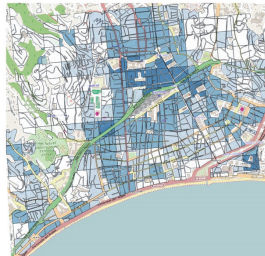
This assessment is based on physiological and behavioural data taken from the results of national and international surveys (AFSSA/ANSES, INSEE, CRÉDOC, ADEME, IRSN, EPA) that may be supplemented by local surveys.

This step includes the search for all possible sources of exposure in order to propose appropriate exposure scenarios through a conceptual scheme of exposure. Distinctions are made between adults and children at different ages, workers and local residents, differences in local consumption habits, etc.

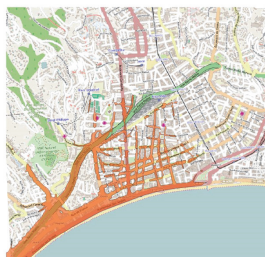
### Step 4: Risk Characterization

This step brings together the work done in the previous steps. It describes the risk run by exposed populations in the form of Hazard Quotients (for the agents with dose threshold effect) and/or excess life-time cancer risk (for agents with no dose threshold effect).

- Risk mapping.
- Discussion on the uncertainties associated with the methodology of health risk assessment.



Layers cross between land use & spatial distribution of population.



Sanitary threshold overrun.



Assessment of the number of people concerned by a sanitary threshold overrun.