**Case study: SIMULATED SITE Roquette s.p.a. (location: Strada Serravalle, 26, 15063 Cassano Spinola AL, Italy)**

**Hypothesis of wrong operation**

**Gas phase**: At T=external=25 °C and p=1atm we suppose the release from the plant stack (h=10m) of fluegas (supposed not hazardous) containing some highly hazardous process intermediates as:

[**2,3,7,8-tetrachlorodibenzo-p-dioxin**](https://en.wikipedia.org/wiki/2,3,7,8-tetrachlorodibenzo-p-dioxin)**,** [concentration in the flue gas = 50 ppm (weight)]

**1,2,3,6,7,8-esachlorodibenzo-p-dioxin** [concentration in the flue gas = 100 ppm (weight)]

The fluegas flowrate is 2 Nm3/s and duration is 10 days

**Hypothesis of authorized release**

**Liquid phase:** Flowrate = 180 m3/hof a mixture of water + dyes

(imagine this flowrate is collected and discharged from the plant to the river by a pipeline)

Measured concentration in liquid phase (at the collector, before mixing with the river) is:

**Azo dye Sudan 1** - 0.1 g/L in water**, Azo dye Sudan 4** - 1g/L in water

The project consists in developing a HHRA study, following the main four steps:

1. **Hazard identification**: classify source and chemicals, search for info about chemicals (toxicity, carcinogenicity, etc) , verify if there is a hazard (in some environmental compartments) by considering law limits;
2. **Effect assessment**: you must search for all the indexes (RfD, SF, DNEL, etc..) you need (in literature, databases EU, USA, Italy) for the released chemicals;
3. **Exposure assessment**: find on the map the possible pathways and using the real map, draw them in the map. Identify all the possible contaminated compartments. Identify possible receptors and routes. Compute EXPOSURE at the receptors using mathematical models (your own developed in Matlab or python or using available Tools. Remember that you must decide/search /estimate the parameters inside the models, as the river flowrate and section, dispersion coefficients, stability classes, wind direction, etc…)
4. **Risk Assessment**: compute risk for people at the receptors (if you want you can group children, adults, etc. using uncertainty factors. You must use formulas for toxic risk and cancer risk);
5. Discuss your results