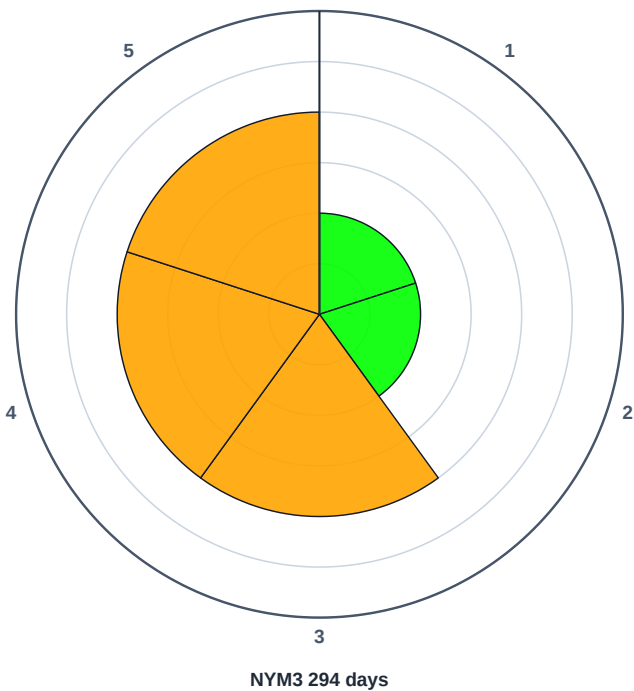


Ecotoxicology Analysis

After Remediation

Locality:	Ferrara, Italy, ER-site
Method:	In situ aerobic bioagmentation (NYM 3)
Bioremediation methods:	After Bioremediation
Sample type:	water
Collection date:	2026-05-12



ORGANISMS

- 1. A. fischeri 15
- 2. A. fischeri 30
- 3. Daphnids
- 4. Algae
- 5. Lettuce aquatic

CATEGORIES

- A. Non-toxic
- B. Low toxicity
- C. Medium toxicity
- D. High toxicity
- E. Very high toxicity
- F. Extreme toxicity

Category Distribution (% of organism readings)

B: 40%

D: 60%

Resulting category: D High toxicity

Test Organisms by Type

Consumers: *Daphnids*
Producers: *Algae, Lettuce aquatic*
Destruent: *A. fischeri 15, A. fischeri 30*

Most sensitive organism: Daphnids

Active ecotoxicity management recommended

Samples fall into category D. At 10% sample concentration inhibition is 20–50%, or EC50 is 10–50%. A significant toxic impact is observed.

- It is recommended to change the remediation technology/procedure, new sampling, new tests and find the main contaminant.

Ecotoxicity Assessment Criteria

CATEGORY	DESCRIPTION	CRITERIA (ACTIVE RULES)
A	Non-toxic	Undiluted sample: inhibition / stimulation -19.99% – 19.99%
B	Low toxicity	Undiluted sample: stimulation 20% – 50%, or Undiluted sample: inhibition 20% – 50%
C	Medium toxicity	Undiluted sample: stimulation 51% – 90%, or Undiluted sample: inhibition 51% – 90%
D	High toxicity	At 10% sample concentration: inhibition / stimulation -50.99% – 50.99%, or EC50 10% – 50%
E	Very high toxicity	At 10% sample concentration: inhibition 51% – 100%, or EC50 1% – 10%
F	Extreme toxicity	At 1% sample concentration: inhibition 10.01% – 100%, or EC50 0% – 0.99%

Notes: A sample's category is the worst (most toxic) grade reached by any single test organism. Determination of EC50 takes precedence over the inhibition value. In a luminescence bacterial test, an undiluted sample corresponds to a sample concentration of 500 mL/L.

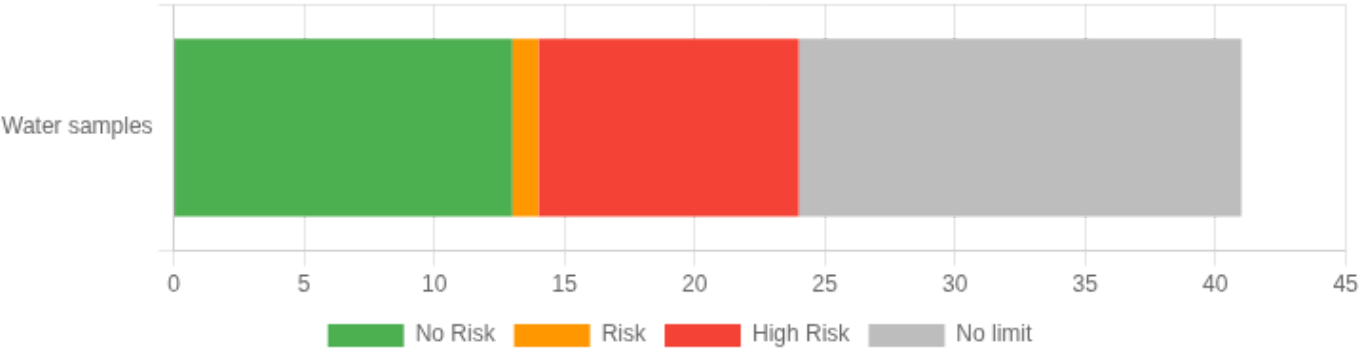
Chemical Risk Assessment

After Remediation

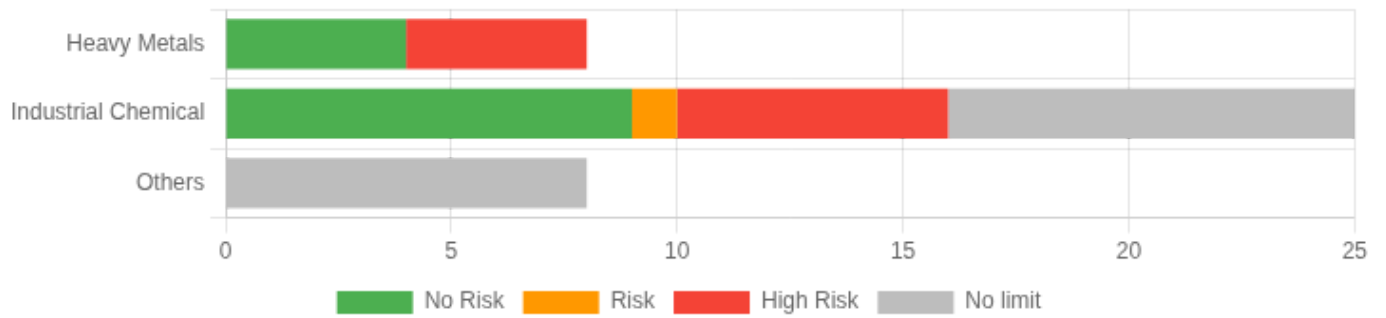
Locality:	Ferrara, Italy, ER-site
Method:	In situ aerobic bioagmentation (NYM 3)
Bioremediation methods:	After Bioremediation
Sample type:	water
Collection date:	2026-05-12

- No Risk — at/below threshold limit
- Risk — over threshold limit (up to 50%)
- High Risk — more than 50% over threshold limit
- No threshold limit — not defined

Risk distribution by sample type



Water samples



No risk 32% Risk 2% High risk 24% No threshold limit 41%

CLASS	NUMBER	OVER THRESHOLD LIMIT	SUM CONCENTRATION
Heavy Metals	8	4	2927.904 µg/L
Industrial Chemical	25	7	20547.1163 µg/L
Others	8	0	437.4 mg/L, 18000 µg/L, 41

SAMPLE	COMPOUND / ELEMENT	CLASS	MEASURED	UNIT
NYM3 294 days	Cobalt	Heavy Metals	882	µg/L
NYM3 294 days	Iron	Heavy Metals	317	µg/L
NYM3 294 days	Manganese	Heavy Metals	806	µg/L
NYM3 294 days	Nickel	Heavy Metals	36	µg/L
NYM3 294 days	1,1-Dichloroethylene	Industrial Chemical	0.64	µg/L
NYM3 294 days	Benzene	Industrial Chemical	146	µg/L
NYM3 294 days	Ethylbenzene	Industrial Chemical	126	µg/L
NYM3 294 days	Sum of organohalogen compounds	Industrial Chemical	35	µg/L
NYM3 294 days	Toluene	Industrial Chemical	789	µg/L
NYM3 294 days	Vinyl chloride	Industrial Chemical	18.1	µg/L
NYM3 294 days	Benzo(a)pyrene	Industrial Chemical	0.0103	µg/L
NYM3 294 days	Aluminium	Heavy Metals	19.1	µg/L
NYM3 294 days	Arsenic	Heavy Metals	7.7	µg/L
NYM3 294 days	Copper	Heavy Metals	860	µg/L
NYM3 294 days	Mercury	Heavy Metals	0.104	µg/L
NYM3 294 days	1,1-Dichloroethane	Industrial Chemical	0.544	µg/L
NYM3 294 days	1,2-Dichloroethylene	Industrial Chemical	4.9	µg/L
NYM3 294 days	Benzo(a)anthracene	Industrial Chemical	0.0224	µg/L
NYM3 294 days	Benzo(b)fluoranthene	Industrial Chemical	0.0068	µg/L
NYM3 294 days	Benzo(g,h,i)perylene	Industrial Chemical	0.0024	µg/L
NYM3 294 days	Benzo(k)fluoranthene	Industrial Chemical	0.0016	µg/L
NYM3 294 days	Chrysene	Industrial Chemical	0.027	µg/L

SAMPLE	COMPOUND / ELEMENT	CLASS	MEASURED	UNIT
NYM3 294 days	Indeno(1,2,3-cd)pyrene	Industrial Chemical	0.0015	µg/L
NYM3 294 days	Pyrene	Industrial Chemical	0.148	µg/L
NYM3 294 days	GRO as hexane	Industrial Chemical	8640	µg/L
NYM3 294 days	Hydrocarbons C10-C40 as n-hexane	Industrial Chemical	180	µg/L
NYM3 294 days	Hydrocarbons C12-C14 (200–250 °C fraction)	Industrial Chemical	28.2	µg/L
NYM3 294 days	m,p-Xylene	Industrial Chemical	1140	µg/L
NYM3 294 days	Naphthalene	Industrial Chemical	46	µg/L
NYM3 294 days	o-Xylene	Industrial Chemical	556	µg/L
NYM3 294 days	Sum of polycyclic aromatic hydrocarbons	Industrial Chemical	0.0123	µg/L
NYM3 294 days	Tetrachloroethylene	Industrial Chemical	16.5	µg/L
NYM3 294 days	Total hydrocarbons as hexane	Industrial Chemical	8820	µg/L
NYM3 294 days	Ammonia nitrogen (as NH4)	Others	23.1	mg/L
NYM3 294 days	Chlorides	Others	200	mg/L
NYM3 294 days	Organic nitrogen	Others	11.4	mg/L
NYM3 294 days	Potassium	Others	8.4	mg/L
NYM3 294 days	TOC	Others	171	mg/L
NYM3 294 days	Total inorganic nitrogen	Others	18000	µg/L
NYM3 294 days	Total nitrogen	Others	23.5	mg/L
NYM3 294 days	Turbidity	Others	41	—

Exceeded chemicals

The following 11 compounds exceeded the threshold limit values and represent a chemical risk (most recent sample shown for each):

Compound	Sample	Date	Class	Measured	Threshold Limit	Risk
Benzo(a)pyrene	NYM3 294 days	12.5.2026	Industrial Chemical	0.0103 µg/L	0.01 µg/L	Risk
Cobalt	NYM3 294 days	12.5.2026	Heavy Metals	882 µg/L	50 µg/L	High Risk
Iron	NYM3 294 days	12.5.2026	Heavy Metals	317 µg/L	200 µg/L	High Risk
Manganese	NYM3 294 days	12.5.2026	Heavy Metals	806 µg/L	50 µg/L	High Risk
Nickel	NYM3 294 days	12.5.2026	Heavy Metals	36 µg/L	20 µg/L	High Risk
1,1-Dichloroethylene	NYM3 294 days	12.5.2026	Industrial Chemical	0.64 µg/L	0.05 µg/L	High Risk
Benzene	NYM3 294 days	12.5.2026	Industrial Chemical	146 µg/L	1 µg/L	High Risk
Ethylbenzene	NYM3 294 days	12.5.2026	Industrial Chemical	126 µg/L	50 µg/L	High Risk
Sum of organohalogen compounds	NYM3 294 days	12.5.2026	Industrial Chemical	35 µg/L	10 µg/L	High Risk
Toluene	NYM3 294 days	12.5.2026	Industrial Chemical	789 µg/L	15 µg/L	High Risk
Vinyl chloride	NYM3 294 days	12.5.2026	Industrial Chemical	18.1 µg/L	0.5 µg/L	High Risk

Threshold limit standards applied

- Water samples — Italy — Groundwater · *D.Lgs. 152/2006 – Allegato 5, Parte IV, Tabella 2*

Chemical Assessment Criteria

Chemical data exceed the threshold limit values

Exceedances of threshold limit values indicate the presence of chemical risk. The remediation is insufficient or ineffective for the substances concerned. It is recommended to identify the source of contamination, reassess the remediation strategy, and propose additional measures. Exceedances are considered relevant above 0.5 µg/L for water samples and 0.5 mg/kg for soil samples.