Environmental regulations and procedures

Lecture 10

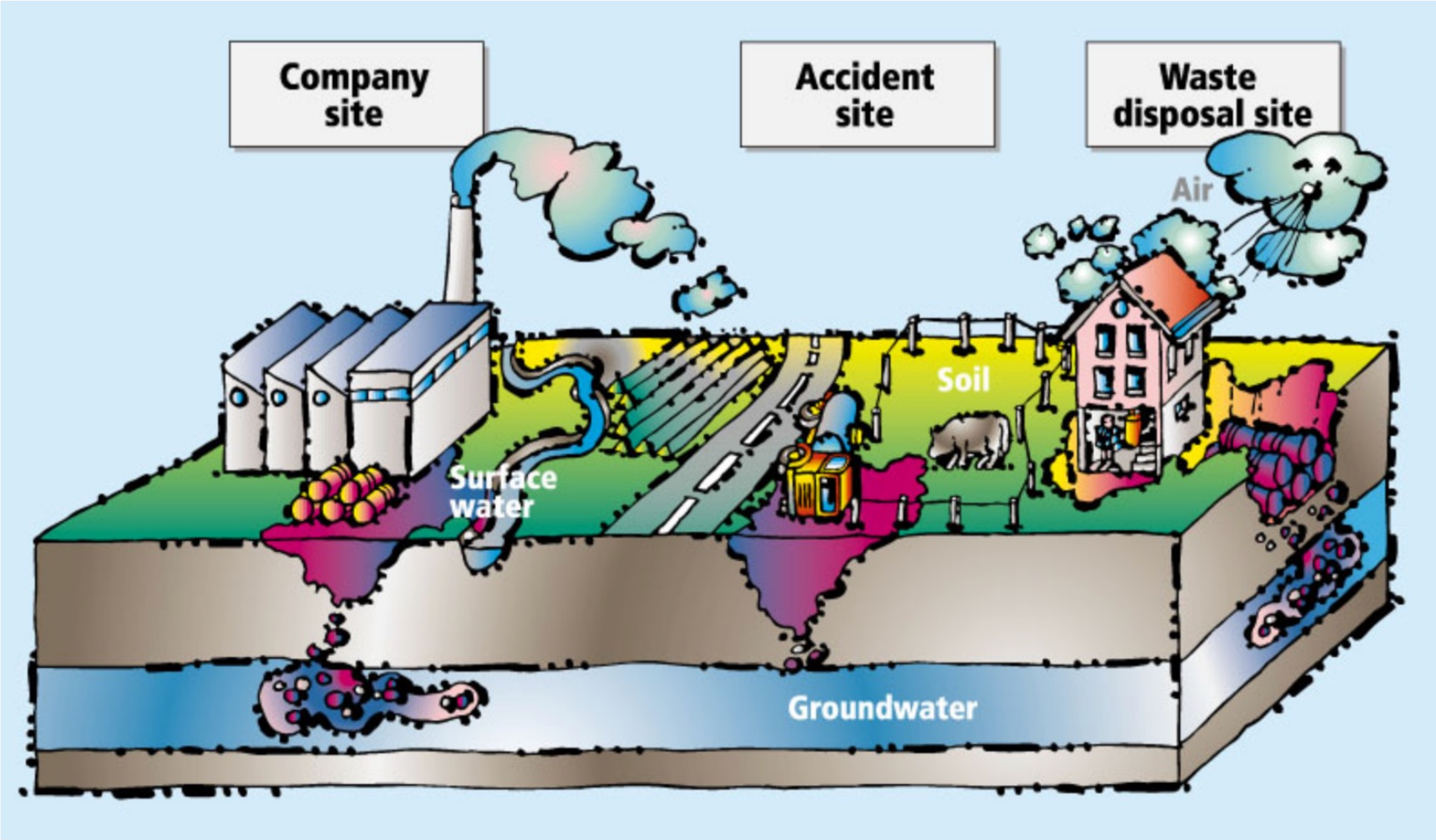
Learning outcomes

- Contaminated sites in Switzerland
- Ordinance on contaminated sites
- Procedure to evaluate and remediation contaminated sites

Contaminated sites in Switzerland

https://www.bafu.admin.ch/bafu/fr/home/themes/sites-contamines.html **(in French)**

Treating contaminated sites, and thus **correcting past mistakes**, is not an exact science, but a site remediation is a measure that is not without its imponderables and surprises.



38,000 sites are polluted

(landfills, industrial sites, accident sites)

Unique situation in Switzerland

Switzerland has escaped large scandals, thanks in no small part, to some of its unique features:

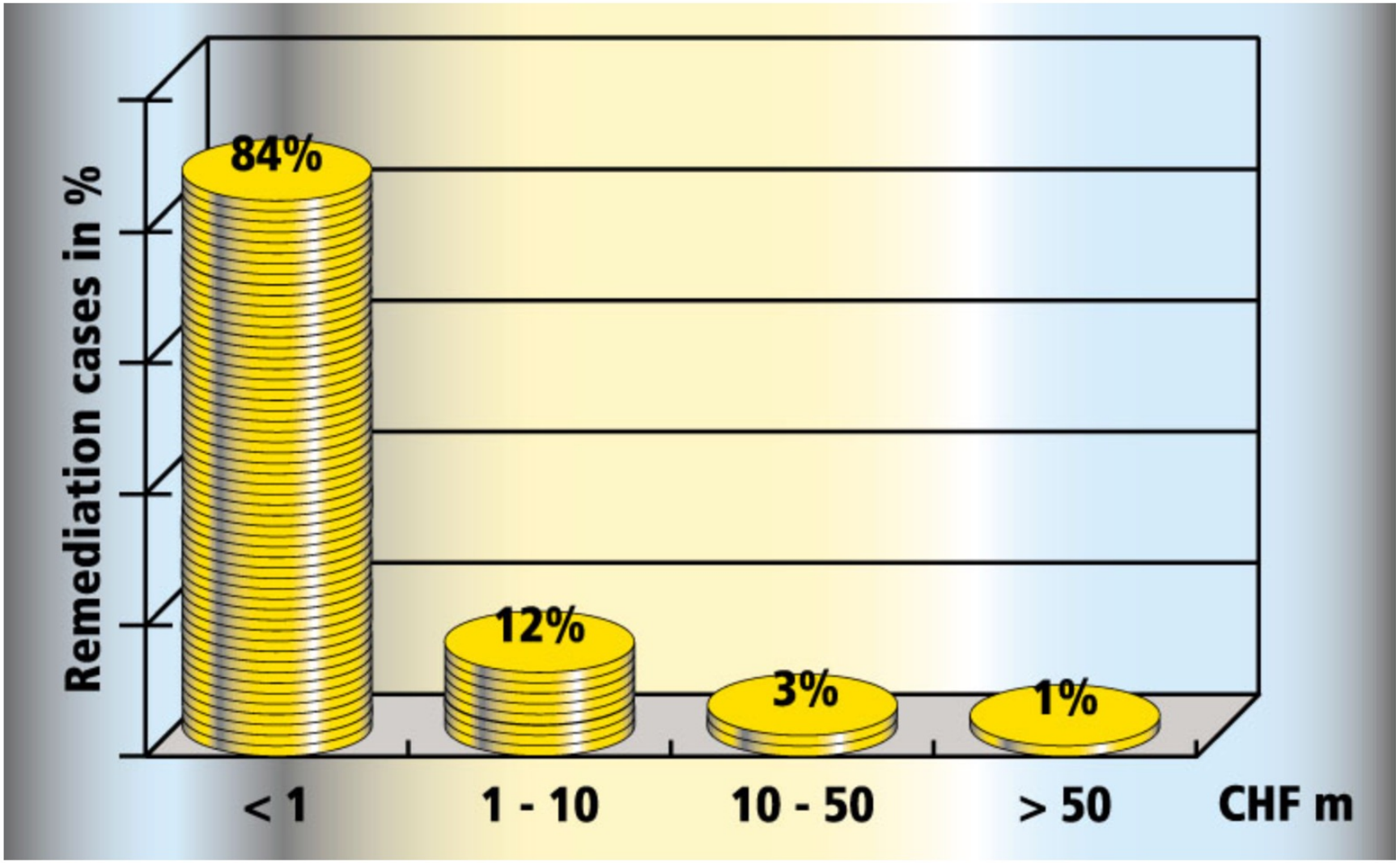
- no mining
- little heavy industry
- small industrial complexes
- no contaminated sites resulting from war
- incineration - not storage - of organo-chemical waste (e.g., household refuse)

Still many sites to be remediated

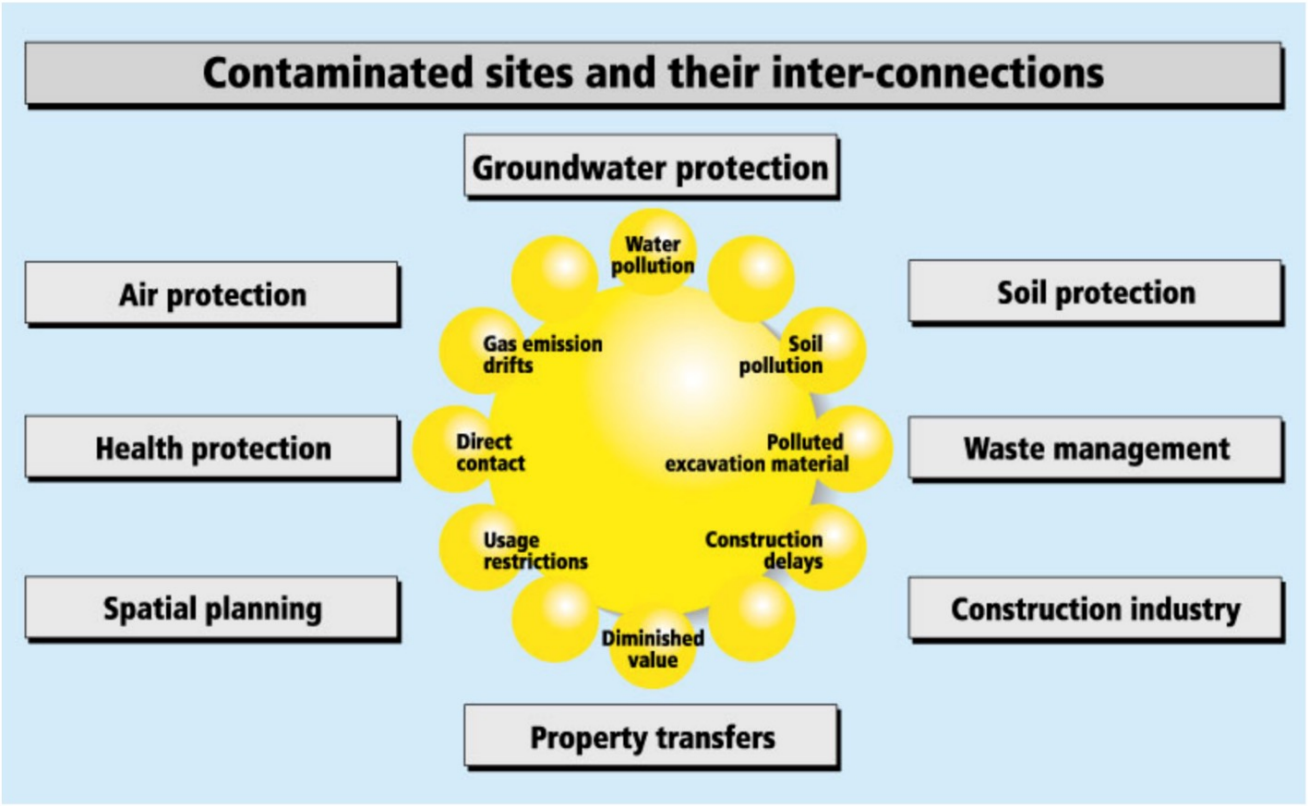
Contaminated sites still represent a serious problem for Switzerland due to

- high population density
- few building lots still available
- a high density of industrial sites and landfills
- intensive farming
- intensive groundwater exploitation
- highly vulnerable groundwater in the immediate vicinity of polluted sites
- many small sites to be remediated, and only a few large ones

Not all sites are expensive to remediate



Objectives



Six objectives must be considered when dealing with contaminated sites.

- long term, sustainable elimination of hazard
- solution to the contaminated sites problem within a generation
- rapid remediation of severe contaminated sites
- stop emissions at source
- cooperation among those affected
- stepwise management of polluted sites

Philosophy of the legislation

- In cleaning up contaminated sites the primary principle to apply is to stop emissions at the source. But pollutants in the subsoil do not constitute contamination in and of themselves; what is relevant is any possible impact on natural resources (water, soil, air).

- Remediation measures are intended to ensure that no amounts of pollution exceeding permissions are able to enter the environment in the long term.

- Cleaning up is intended to affect the long-term, sustainable elimination of the danger. It is unacceptable that over generations a site must be subjected to intensive monitoring or cost-intensive treatment; equally, problems cannot simply be relocated from one site to another.

- But that doesn't mean that every remediation requires removal of the pollutants from the site. The danger from well degradable pollutants can be eliminated with long-term securing measures or by restricting the use of the soil.

- Finally, remediation of contaminated sites is in the interest of the public in many cases. Efficient and cost-justified remediation is often only achieved where those affected can be broadly convinced of its necessity.

Contaminated Sites Ordinance (Osites)

How is the Contaminated Sites Ordinance structured and what provisions does it contain?
How is a contaminated site defined? (Updated July 2024)

- **Section 1** (art. 1 through 4) establishes the purpose and scope of the ordinance and defines important terminology.
- **Section 2** (art. 5, 6 and 6a) specifies how sites polluted by wastes are to be registered in a publically accessible register and how this register is to be maintained.
- **Section 3** (art. 7 - 13) specifies how a polluted site is to be assessed and classified by means of a preliminary investigation of its need for remediation or monitoring.
- **Section 4** (art. 14 and 15) defines the objectives and urgency of a remediation on the basis of a risk assessment made after a detailed investigation.
- **Section 5** (art. 16 - 19) establishes how remediation projects are to be drawn up and the criteria used by the authorities to approve the remediation measures; the assessment of results and the duty to report are also specified.
- **Section 6** (art. 20) specifies who the authorities may require to carry out investigations, monitoring and remediation measures.
- **Section 7** (art. 21 - 28) covers the final provisions.
- **Annexes:** contain values for assessing the impacts on water, soil and air and the requisite procedures for carrying out such assessments.

Contaminated vs polluted

Two important definitions with a difference:

- **Polluted sites** are operative or inoperative waste disposal sites (landfills) and industrial and accident sites in which waste was deposited or infiltrated.

- **Contaminated sites** are polluted sites that cause harmful effects or nuisances or for which there is a real danger that such effects may arise. Such sites require remediation!

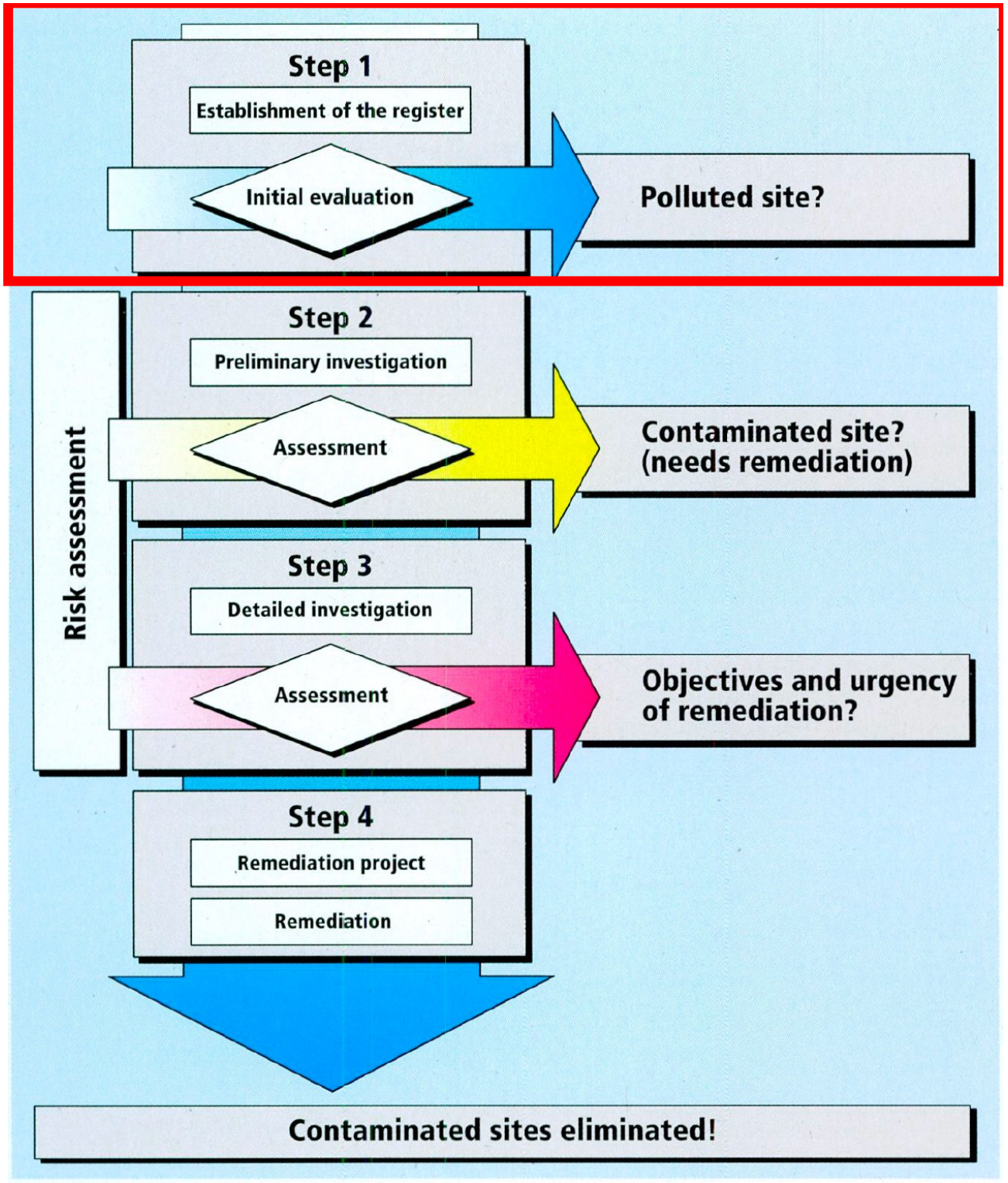
A stepwise approach

- Remediation cannot take place for all sites are once
- Stepwise approach to evaluate:
  - Needs
  - Urgency level
  - Limit useless detailed and costly investigations

(for example, by 2014, all cantons should have a register of contaminated sites).

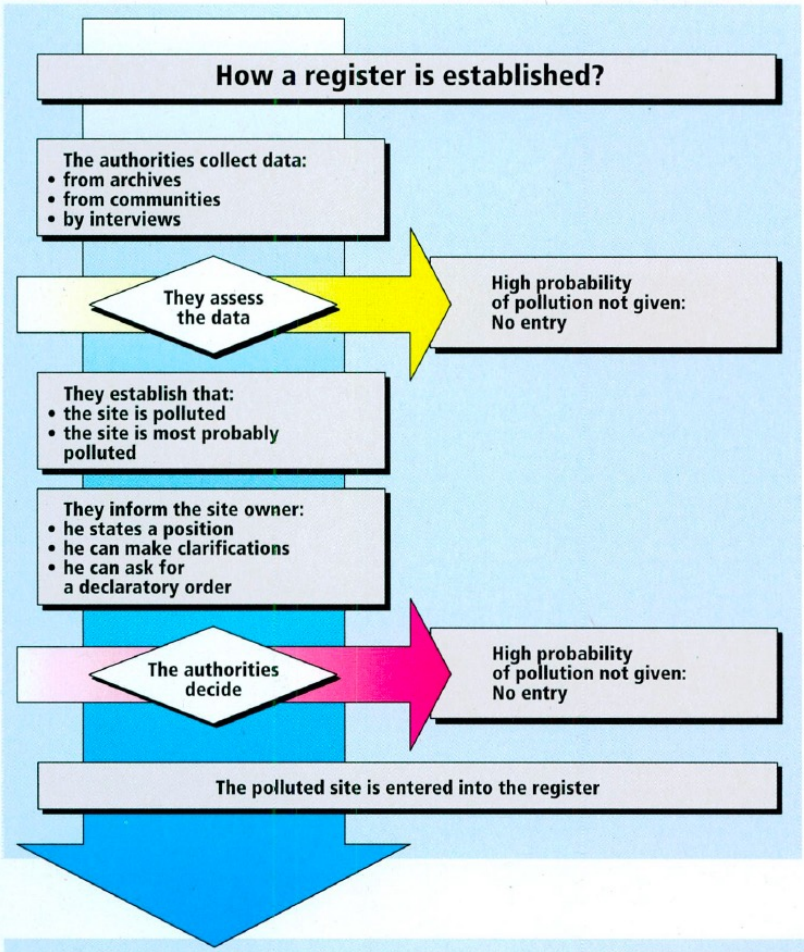
Step 1

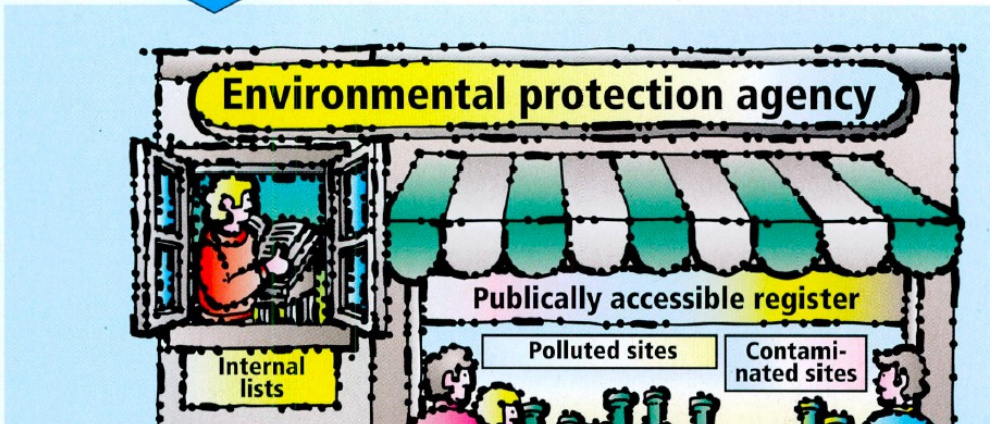
- Clarification concerning the pollution of a site
- Initial evaluation,
- Informing the site's owner
- Registration to the register of polluted sites
- Initial assessment



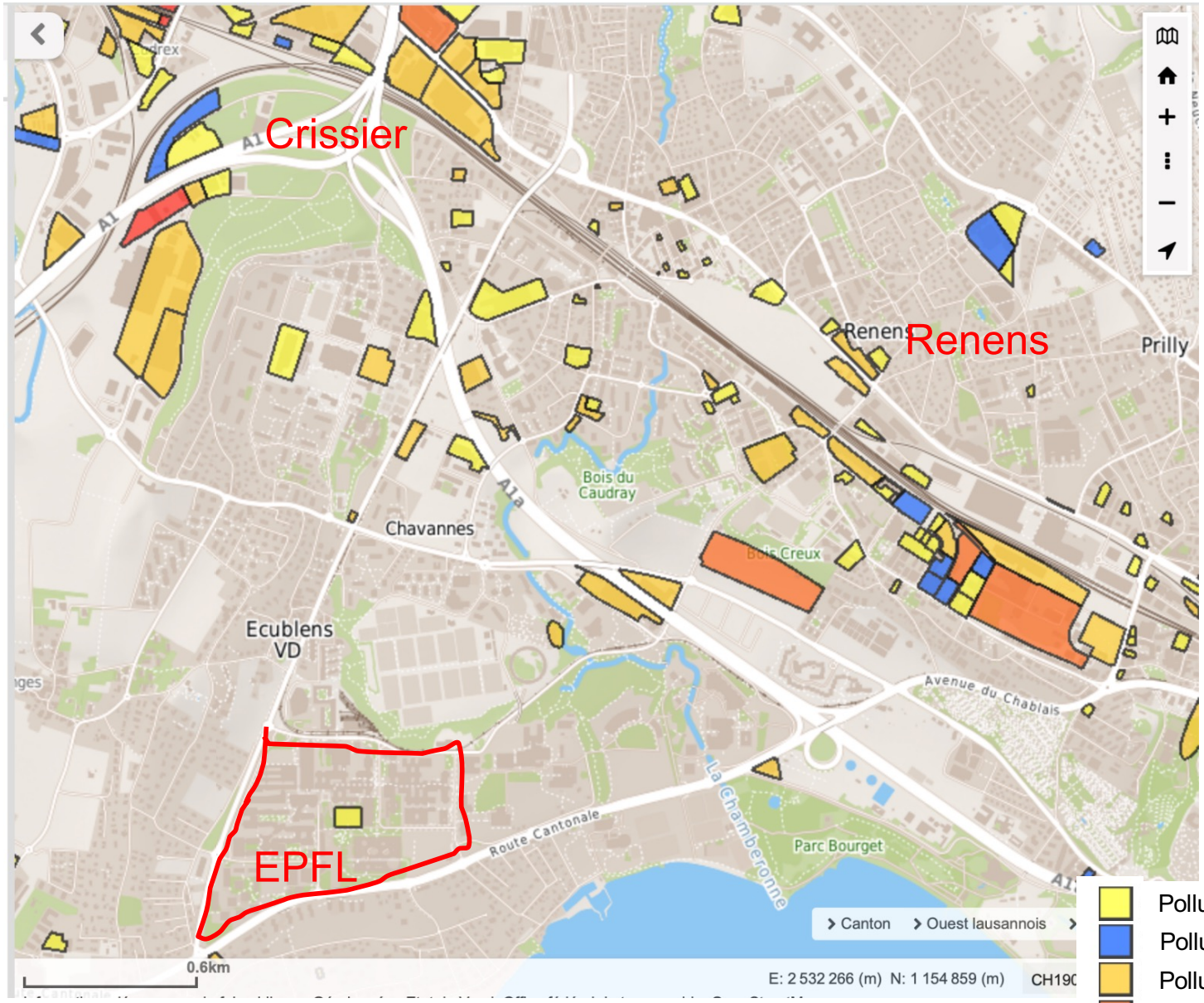
How to establish a register?

- For accident and waste disposal sites, the process is straightforward
- For company sites:
  - Contact gas works, galvanizing operations, dry cleaning, paint and varnish companies and shooting ranges
  - Were there any environmentally hazardous chemicals used at all?
  - Is it possible that any entered the subsurface?
  - How long was the company in operation?



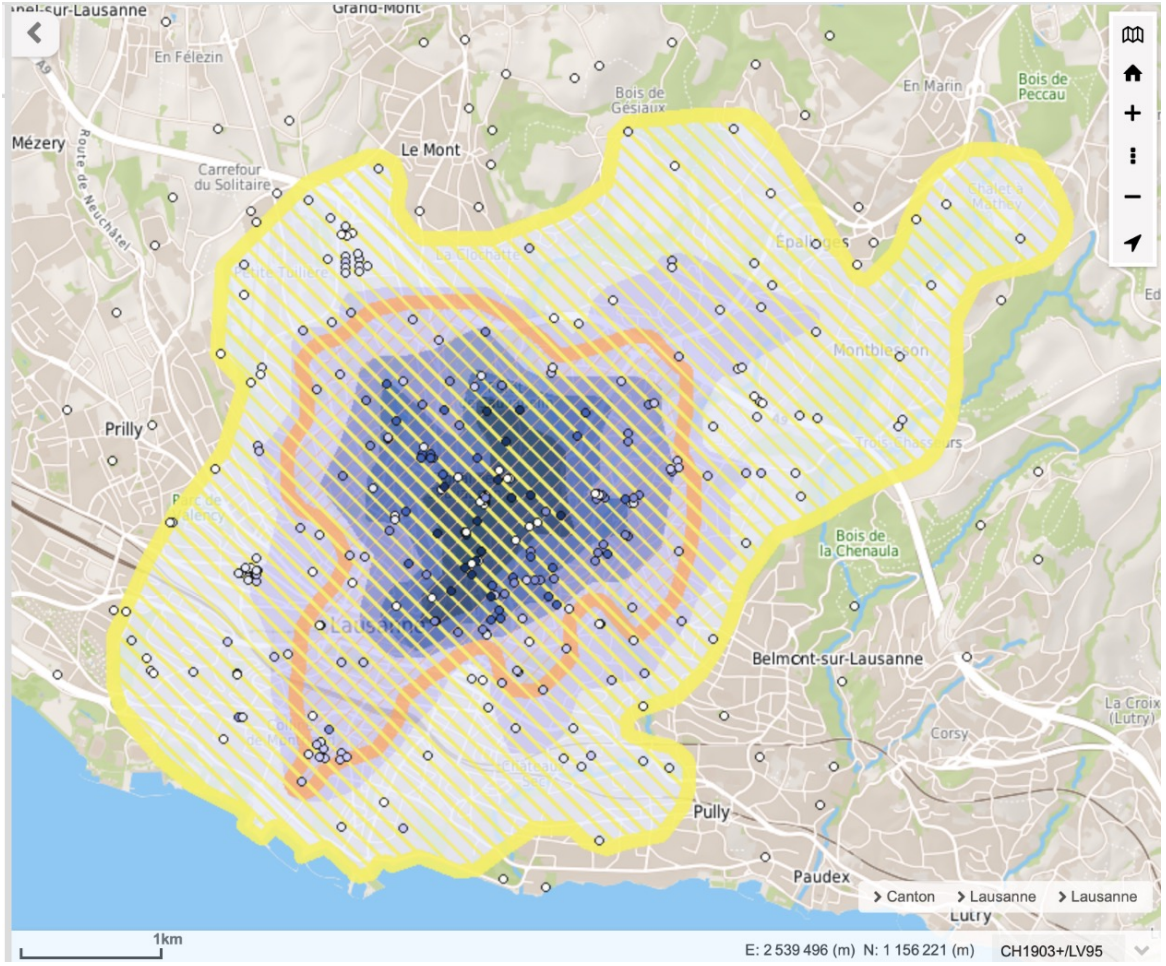


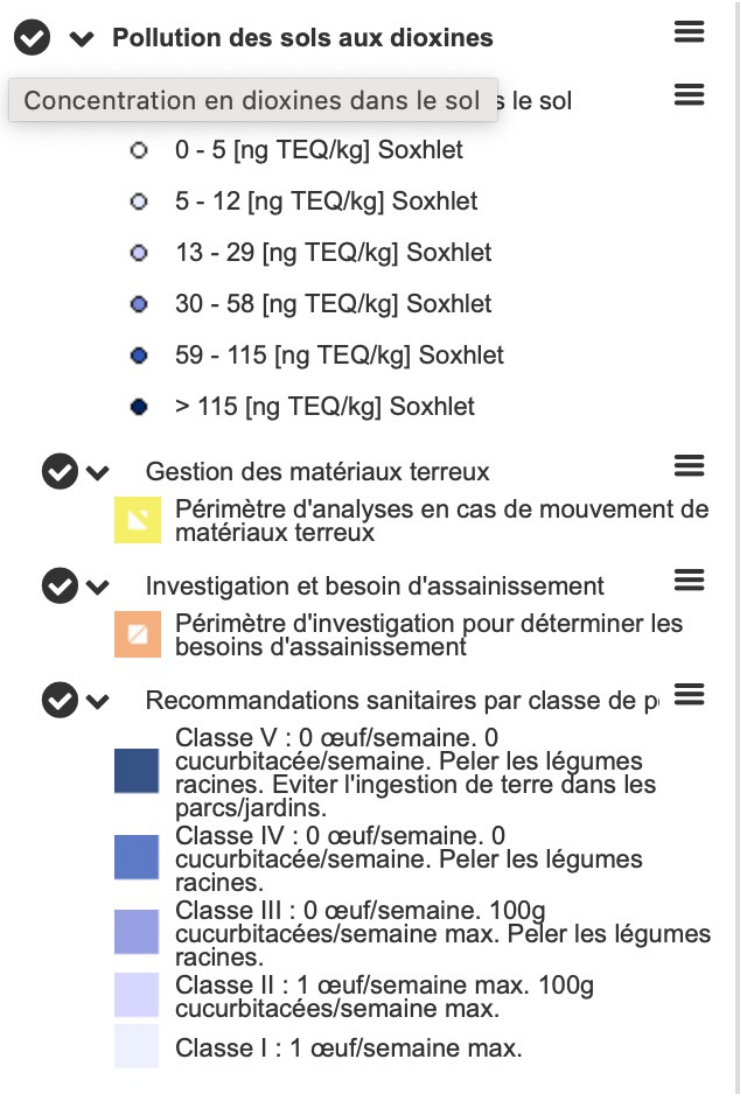
Register of polluted sites (VD example)



- Polluted, no negative impact
- Polluted, investigation needed
- Polluted, no remediation nor monitoring needed
- Polluted, monitoring needed
- Polluted, remediation needed
- Polluted, need of investigation to assess

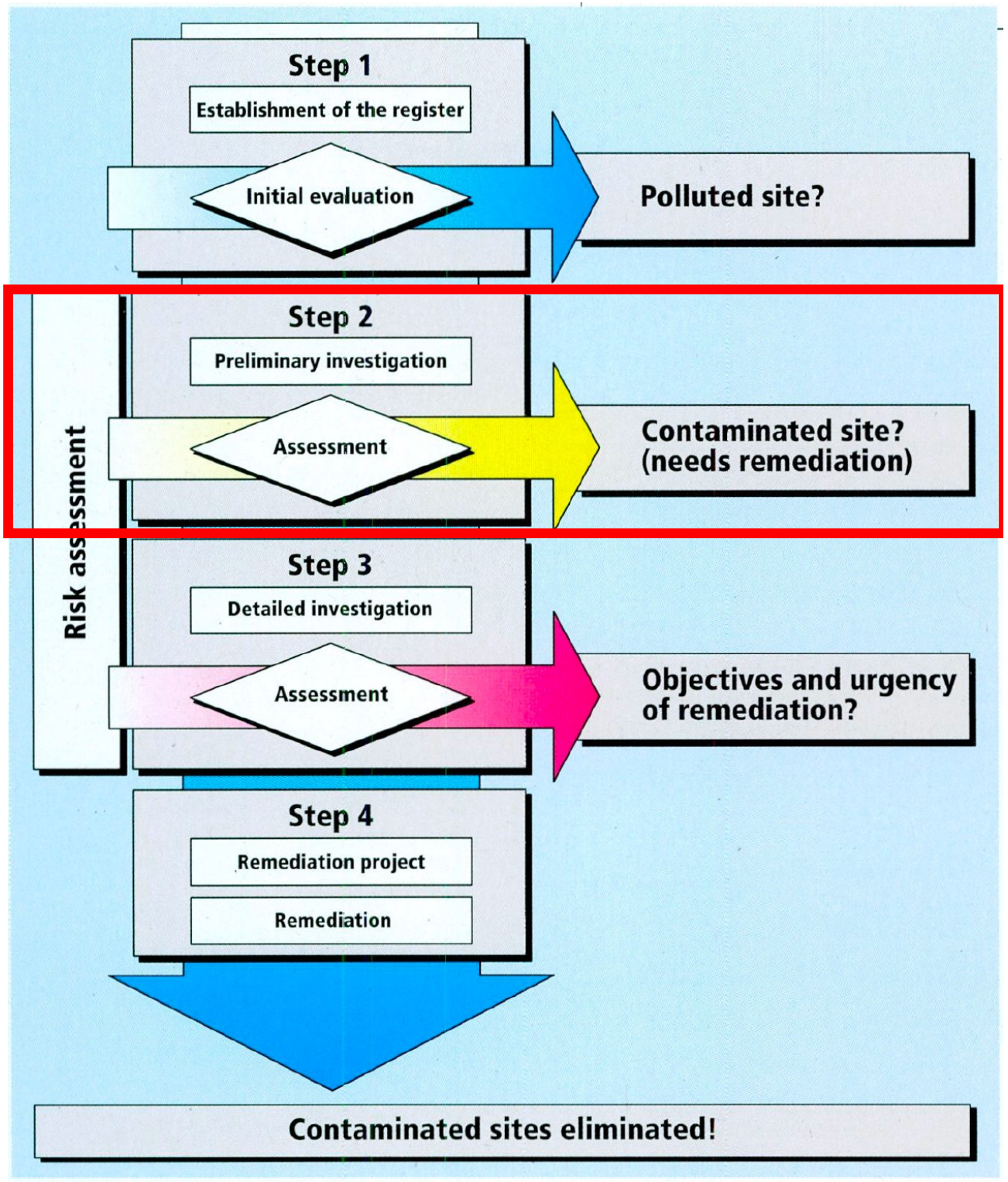
Dioxin in soils in Lausanne





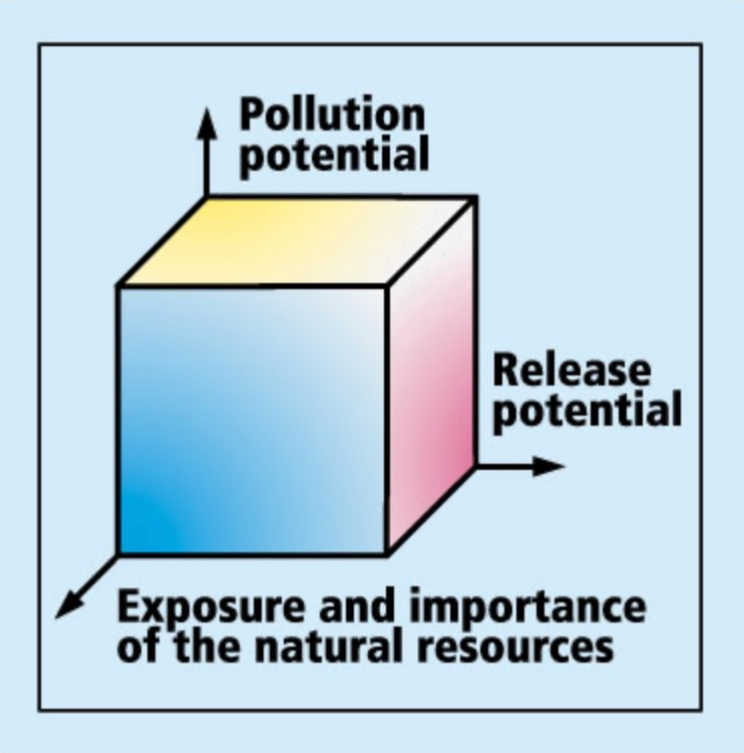
- A waste incineration plant in Lausanne has contaminated the soil with dioxins
- The register shows the measurements and the extent of restrictions on consumption of eggs and plants from the contaminated area.

Step 2


Step 1
Establishment of the register
Initial evaluation
Polluted site?
Step 2
Preliminary investigation
Assessment
Contaminated site?
(needs remediation)
Risk assessment
Step 3
Detailed investigation
Assessment
Objectives and urgency
of remediation?
Step 4
Remediation project
Remediation
Contaminated sites eliminated!

Risk assessment

Sites must be evaluated on a case-by-case basis: Just measuring concentrations and making an assessment on the basis of set limits is not enough.



An evaluation of the environmental hazard (risk assessment) is based on the following criteria:

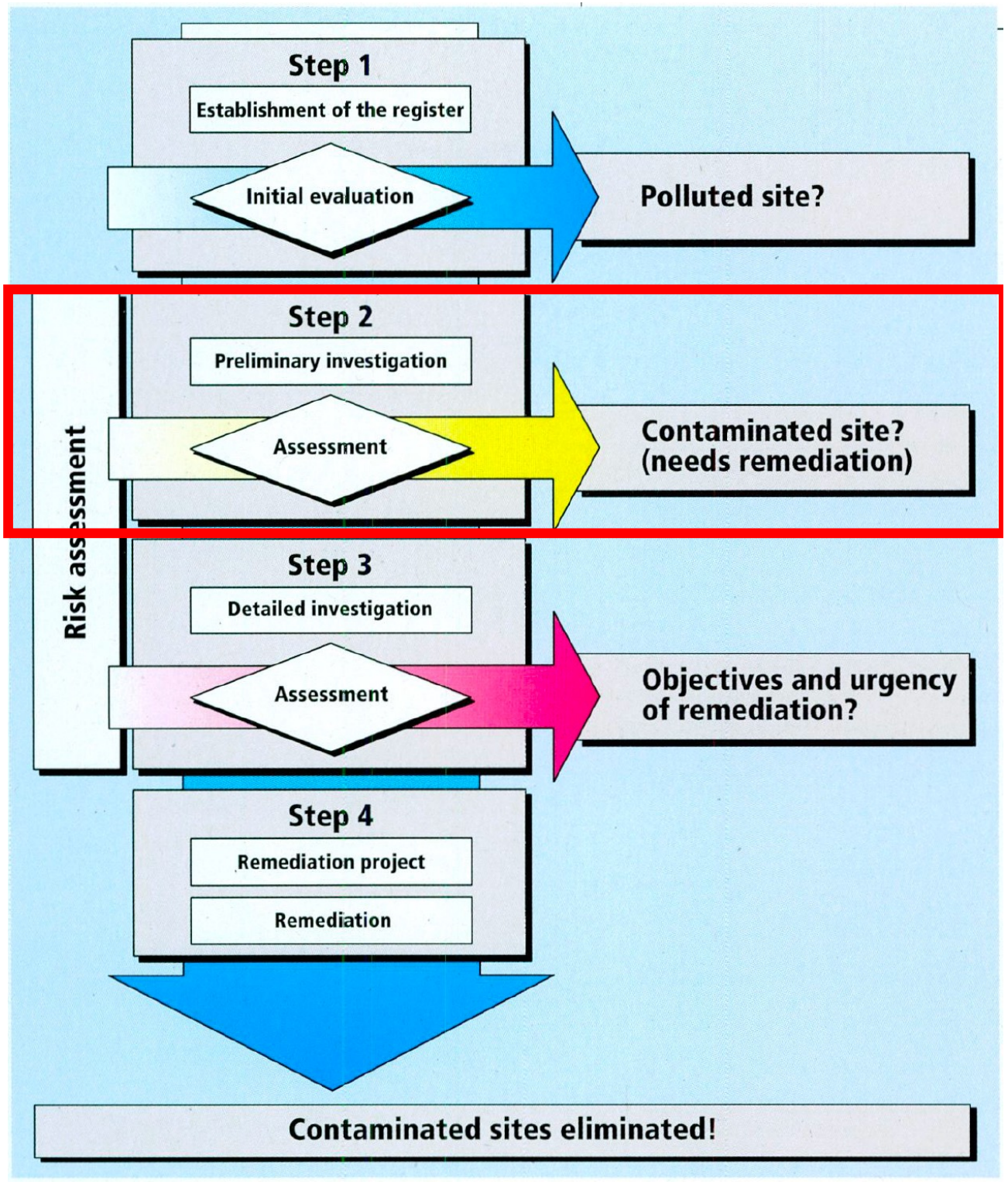
- **Pollutant potential** - how dangerous are the pollutants and in what quantities are they present?

- **Release potential** - How fast, how far and in what quantities will the pollutants be released and transported?

- **Exposure and importance of natural resources (water, soil, air)** - Can the pollutants reach natural resources at all? And how great is the extent of any potential damage?

Step 2

- Historical investigation
- Plan technical investigation
- Perform technical investigation (soil, water, air)
- If preliminary investigation shows that the polluted site is in need of remediation (=> it becomes a contaminated site), then a detailed investigation is needed (determination by the authorities)

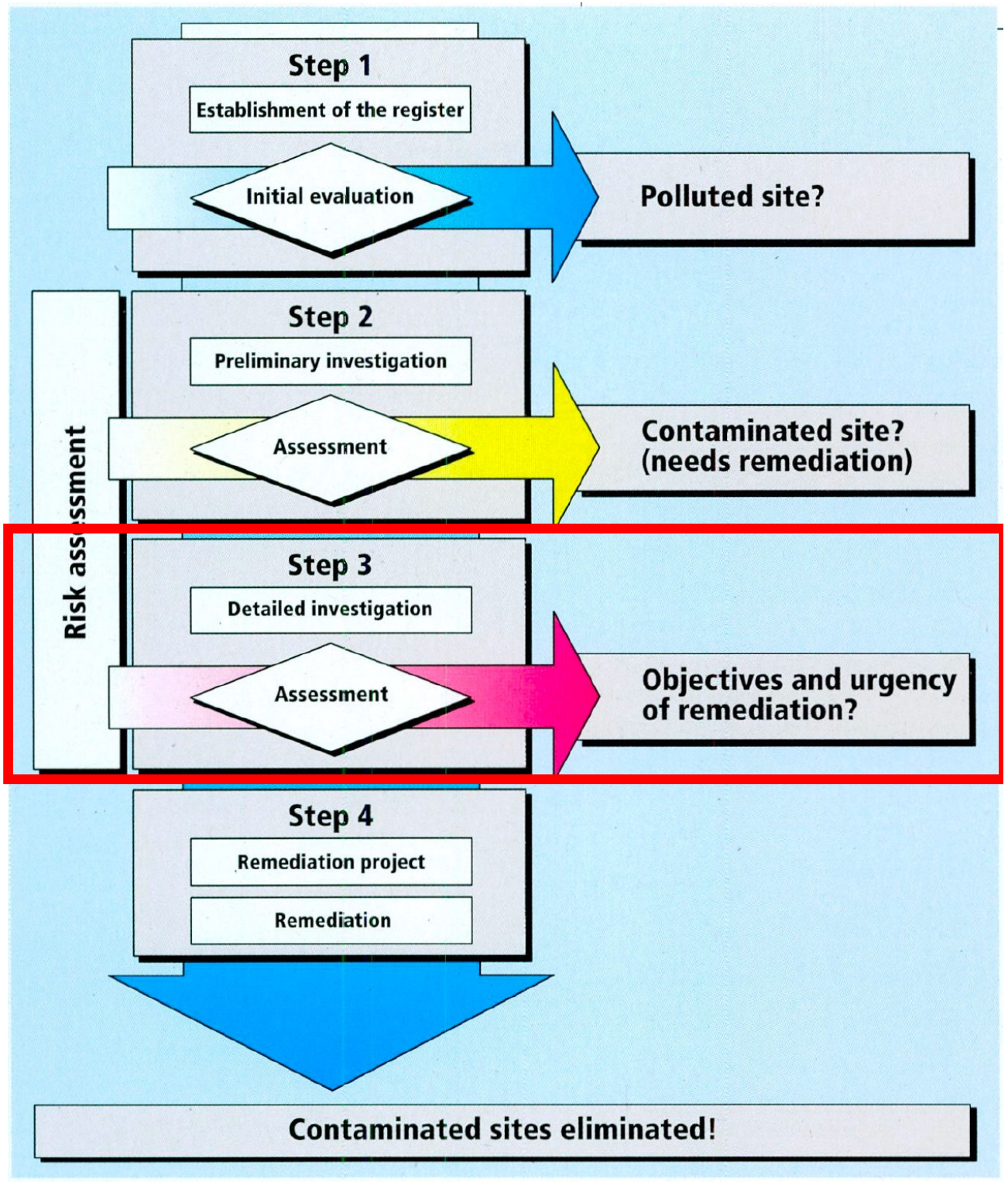


Preliminary investigation

- Preliminary investigation is a three-stage process:
  - Historical investigation
  - Drawing up technical investigation specifications
  - Technical investigation

Step 3

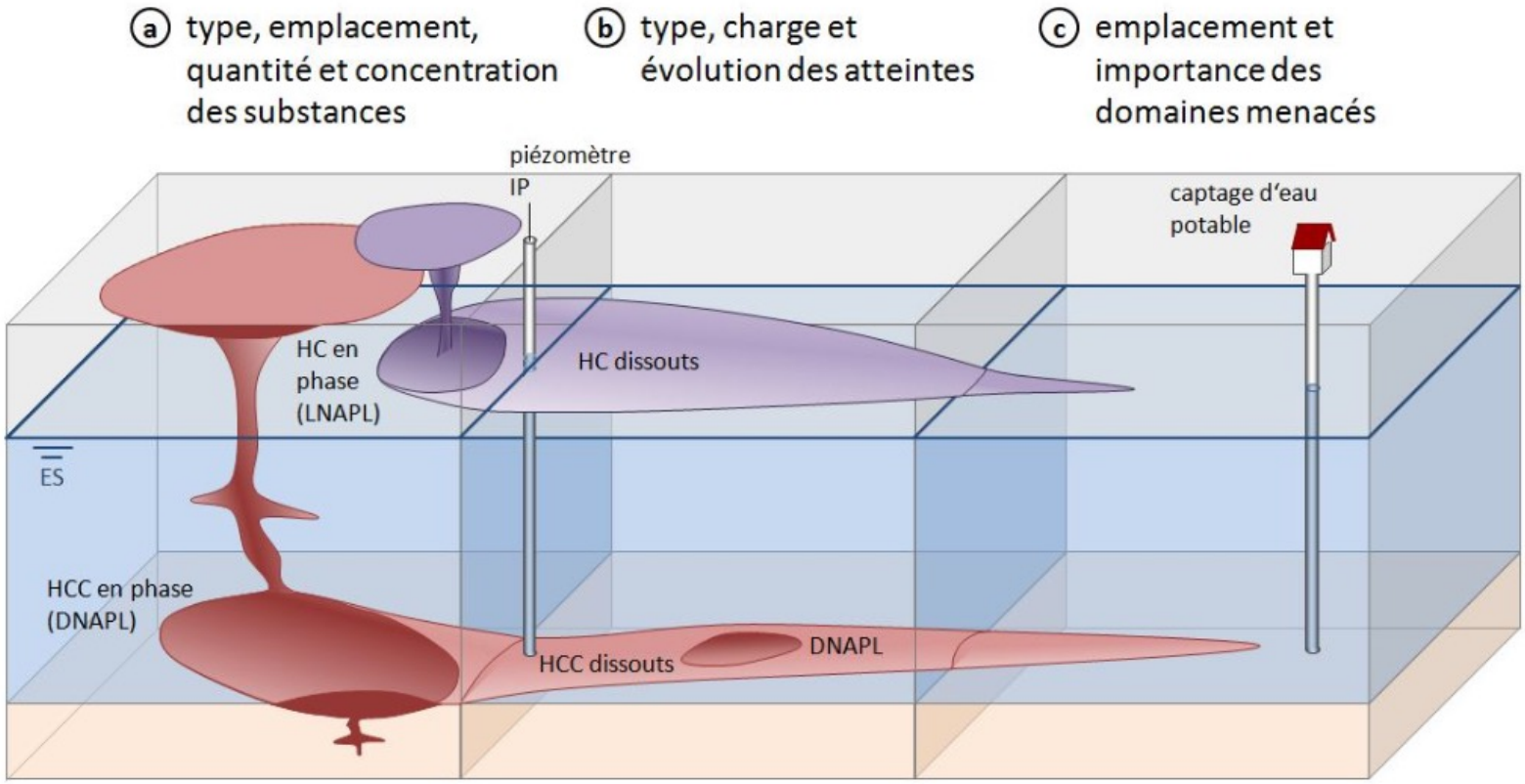
- A detailed investigation will inform on the type and extent of the contamination and its potential impact => will establish the urgency of the remediation
- Primary goal: restrict pollutants from entering a protecting natural resource.



Detailed investigation

- aims to provide precise information on the type and extent of pollution, as well as on the damage it is likely to cause, in order to define remediation goals
- determines the urgency of remediation, which depends on
  - the presence of hazardous substances
  - the speed of their dissemination or
  - the sensitivity and importance of the environments to be protected
- the urgency of remediation does not depend on a change of use of the site or the availability of funds

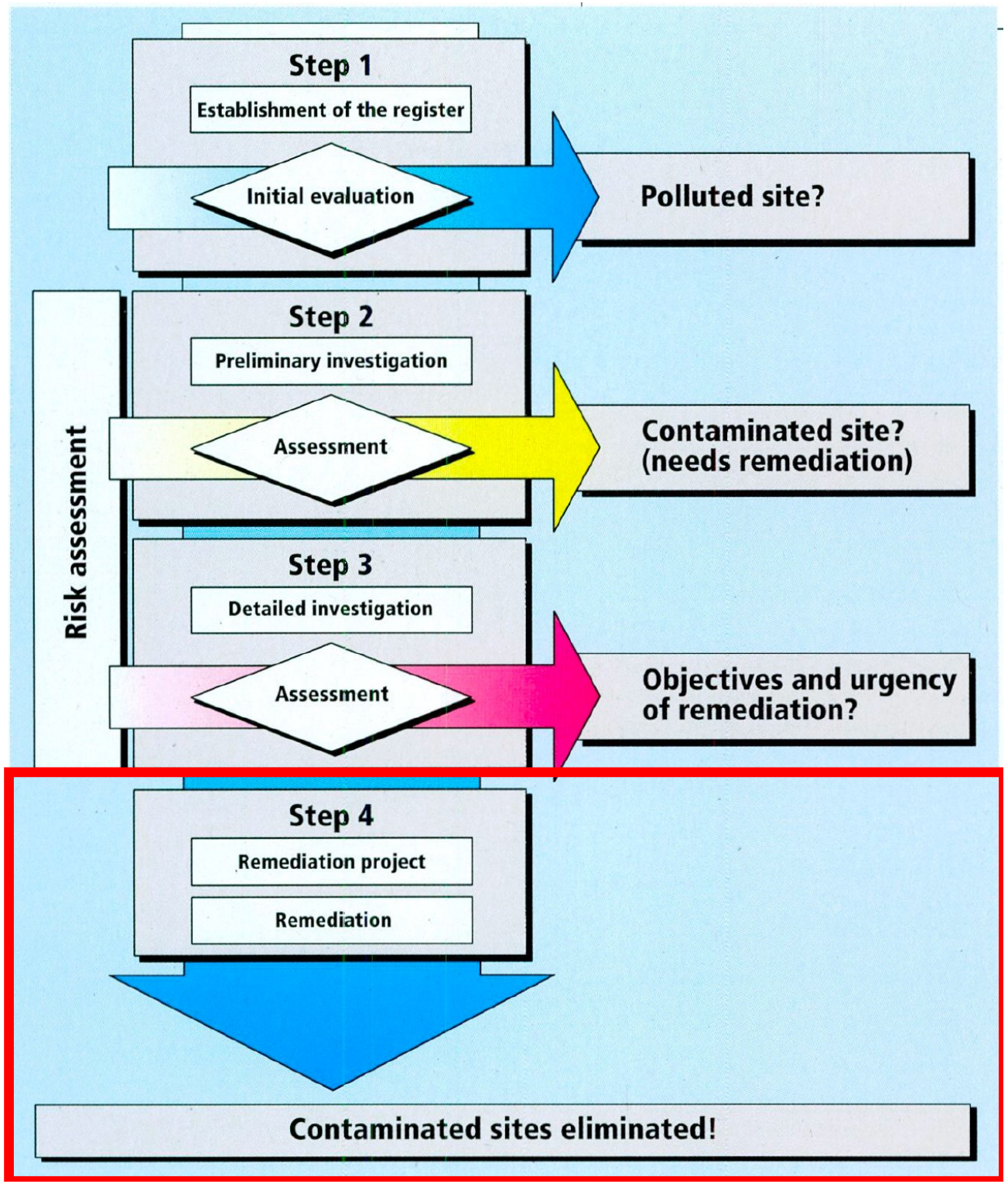
Detailed investigation



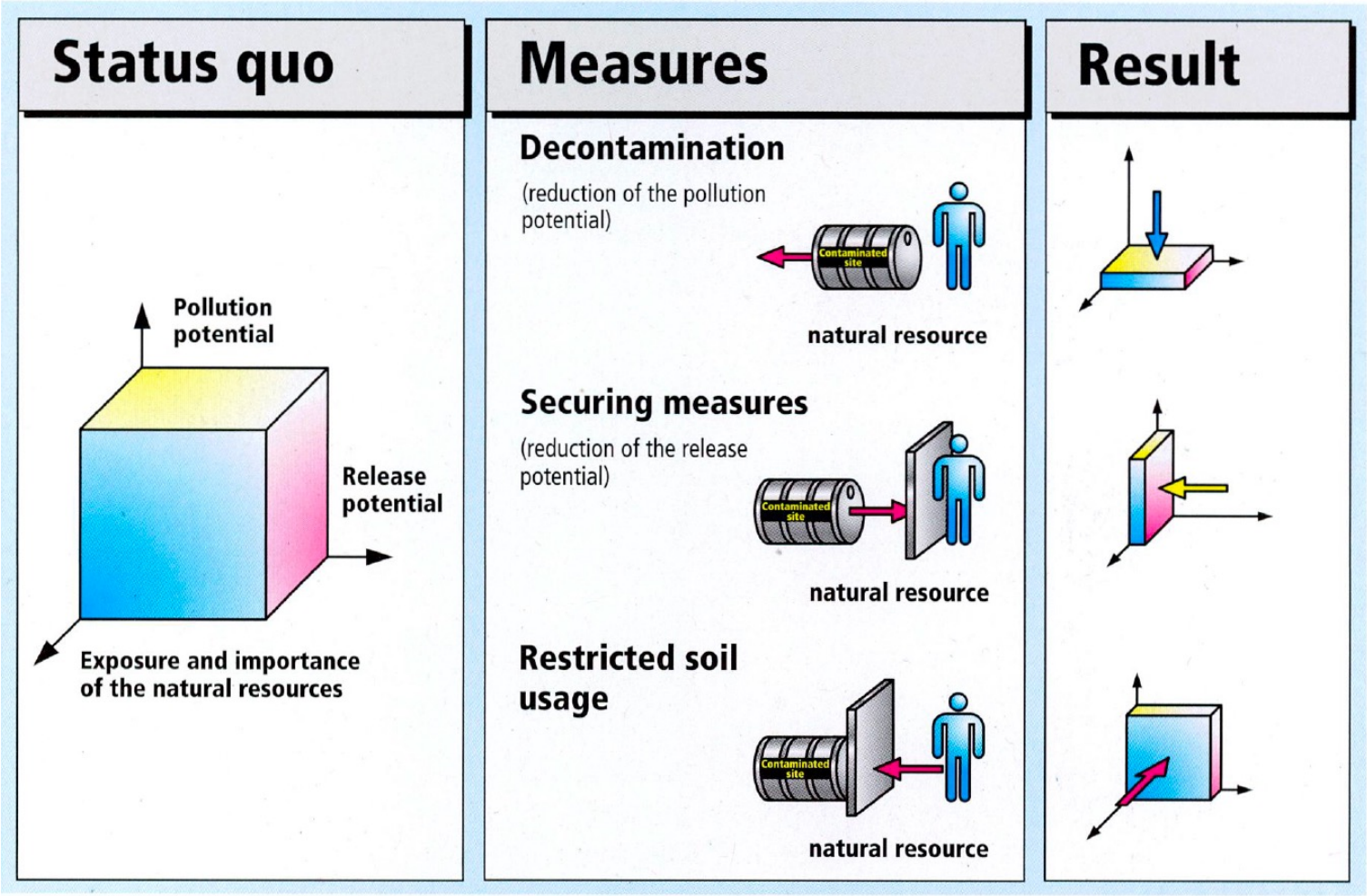
- Initial goal: source removal
- Evaluate urgency of the remediation:
  - Type, location and concentration of the contaminants
  - Type, extent and rate of change of the plume
  - Location of sensitive receiving body

Step 4

- Plan and implement remediation strategy
- Monitor results



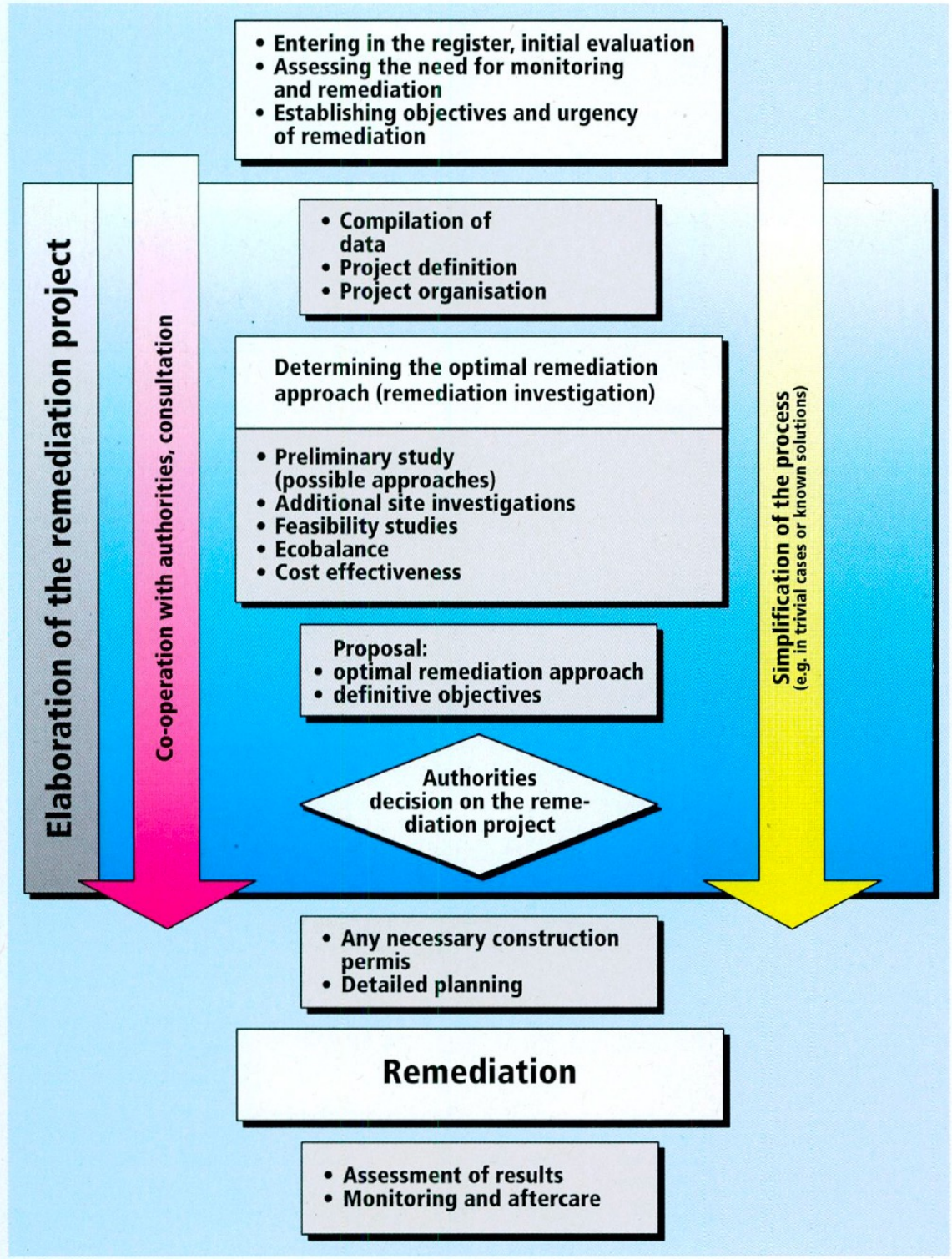
Remediation

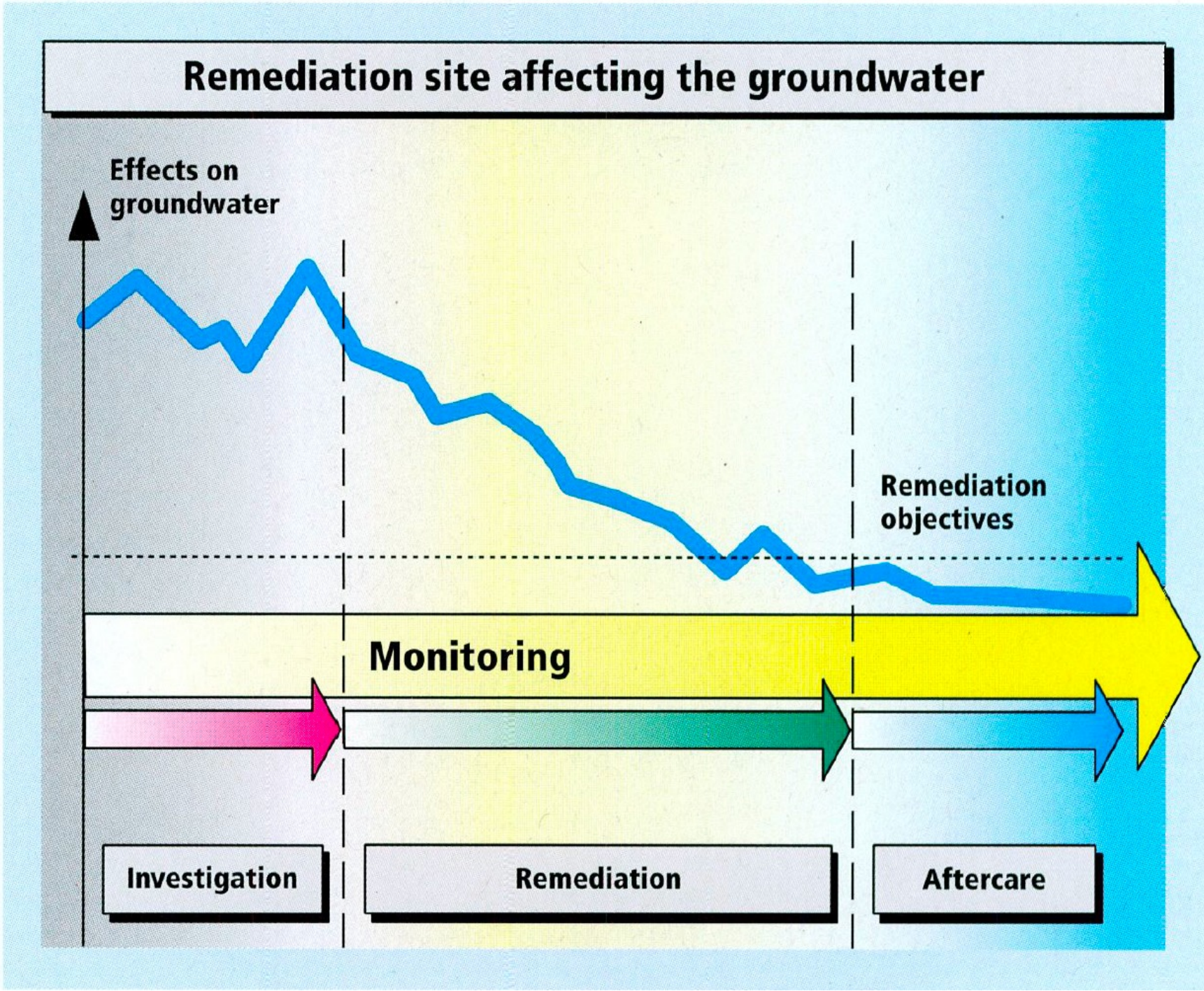


Various strategies:

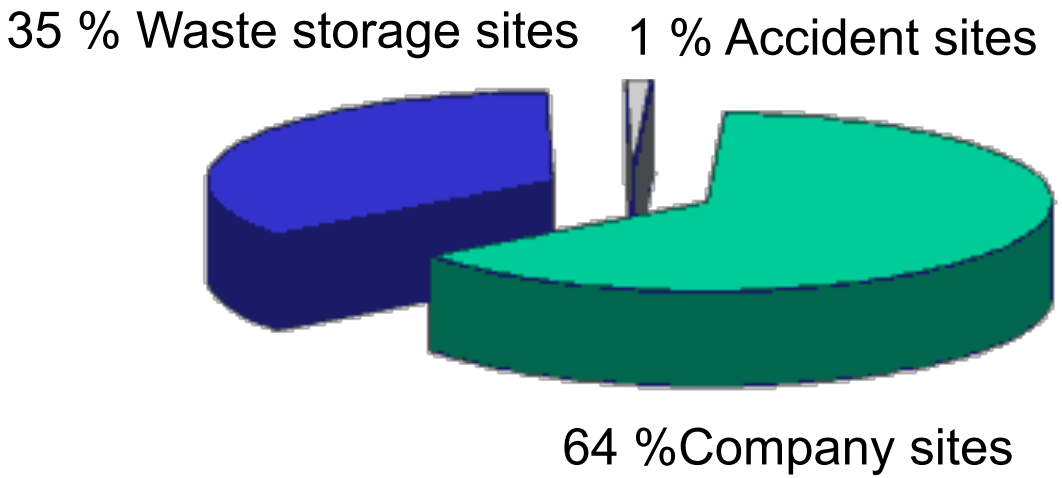
1. Removal of the contaminant
2. Containment of the contaminant
3. Protection of the population

Designing a remediation project



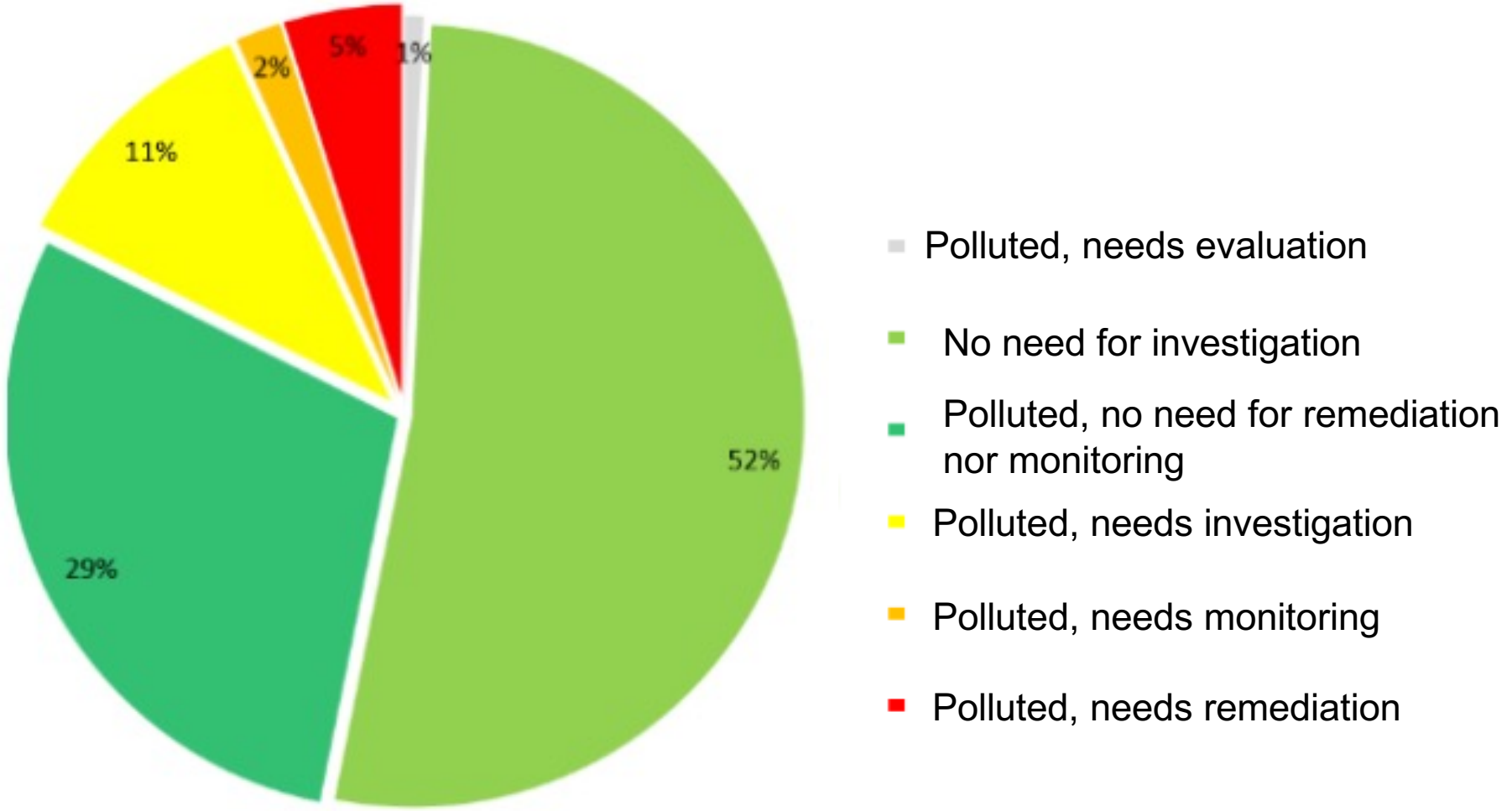

Remediation site affecting the groundwater
Effects on groundwater
Remediation objectives
Monitoring
Investigation
Remediation
Aftercare

Initial situation



- Approximately 38,000 sites to be included in the register of polluted sites
- Around 15,000 of these sites will require further analysis.
- Ultimately, between 3,000 and 4,000 sites that are hazardous to people and the environment will have to be cleaned up.
- Rehabilitation is expected to cost 5 billion francs and last until 2025.
- 80% of refurbishments should cost less than one million francs per site.

Distribution of status of contaminated sites



- 38,000 sites are logged in the registry
- 4,000 are contaminated sites (in need of remediation)
- 1,800 have already been remediated
- Progress is being made in remediation of contaminated sites.
- However, the objective of remediating all sites in need of remediation by 2045 will not be achieved at this pace.

Clean-up of large contaminated sites

Hazardous waste landfill in Kölliken (AG)

Ongoing (1985-2028)
664,000 tons
900 million CHF

Feldreben landfill, Muttenz (BL)

Planned
115,000 m^3
280 million CHF

Clean-up of large contaminated sites

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La Pila landfill, Hauterive (FR)

Ongoing (2009- ?)
270,000 m^3
150 million CHF

Clean-up of large contaminated sites

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150 million CHF

Hazardous waste landfill Bonfol (JU)

Ongoing (2000-?)
175,000 tons
380 million CHF

Stadmist landfills, Solothurn (SO)

Ongoing (2022-2030)
360,000 m^3
120 million CHF

Clean-up of large contaminated sites

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380 million CHF

Stadmist landfills, Solothurn (SO)

Ongoing (2022-2030)
360,000 m^3
120 million CHF

Gamsenried landfills, Gamsen (VS)

Planned
3,000,000 m^3
? million CHF

Who is responsible for remediation?

- Regulated by the Environmental Protection Act (Loi sur la Protection de l'Environnement, LPE) and OSites
- Many potential stakeholders:
  - FOEN and local authorities
  - the site owner
  - its banks and insurers
  - potential buyers
  - local residents
  - consumers of drinking water
- In principle, the owner of the polluted site must carry out the required measures (investigations, monitoring, remediation, follow-up).
- The authority can compel those responsible for the pollution to do so.
- First, the "disrupter by behavior" has to pay, then the "disrupter by situation" (site owner).

Collaborative approach

- Authorities should make as few of the decisions as possible.
- Collaboration between stakeholders is key
- Partnership between the authorities and the economy first, then policy.
- These are either individual agreements between site owners and the authorities, or
- Collective agreements between business sectors and the authorities => a sectoral agreement.

Procedure:

- Hearing of persons directly concerned (art. 23, para. 2, OSites)
- Implementation of ordinance through sectoral agreements (art. 23, para. 1, OSites)
- Waiver of decision in certain cases (art. 23, para. 3, OSites)
- Derogation from the usual procedure (art. 24, let. d, OSites)
- Delegation of enforcement tasks (art. 43 LPE)

Who pays for remediation?

- Technical measures for the investigation, monitoring and remediation of polluted sites must comply with the objectives and regulations of the Environmental Protection Act and the Contaminated Sites Ordinance (CSO).
- Under Art. 32e, para. 3, of the Environmental Protection Act, the Confederation contributes to the costs of these measures, as well as to the costs of investigating sites that turn out to not be polluted.
- To this end, it levies a tax on the landfilling of waste. In accordance with Art. 32e, para. 4 of the Environmental Protection Act, compensation is paid to the cantons according to their expenditure and amounts to 40% or 30% of the chargeable costs.
- Only measures that are environmentally friendly, cost-effective and in line with technological developments are eligible for funding.
- The implementing provisions governing the Confederation's financial participation are set out in the Ordinance on the Fee for the Remediation of Contaminated Sites (OTAS).
- The Federal Office of the Environment (FOEN) manages these resources through a special fund, the OTAS Contaminated Sites Fund. It collects the fees and decides on the allocation of compensation.

Who pays for remediation?

- The cost of remediation of all sites is expected to exceed 5 billion CHF.
- In many cases, the parties responsible for contaminated sites cannot be identified or are insolvent, so that the community bears the costs of remediation.
- In such cases, and when the remediation involves a landfill for municipal waste or a shooting range, the Confederation covers 40% or 30% of the remediation costs.
- Ordinance on the Fee for the Remediation of Contaminated Sites (OTAS) (2001) regulates the tax levied on waste disposal in Switzerland and abroad.
- OTAS generates a revenue of around CHF 40 million a year.
- These funds are earmarked for the treatment of contaminated sites and paid to the cantons.
- The main aim is to ensure that environmentally hazardous contaminated sites are remediated as quickly as possible, and not passed on to future generations for lack of funds.

Who pays for remediation?

In Switzerland, the cost of landfill disposal is:

- for type B landfills: 5 francs/t;
- for type C, D and E landfills: 16 francs/t.

The tax rate for waste deposited abroad is as follows:

- for underground landfills: 22 francs/t;
- on other landfills: at the same rate as the tax that would be levied on the permanent storage of waste in Switzerland.
- the OTAS tax is only levied in cases where **more than 15%** of the exported waste is landfilled as treatment residues.
- Types of landfill in Switzerland (based on OLED, Ordinance on waste disposal, Annex 5) (simplified)
  - Type A: uncontaminated excavation materials
  - Type B: vitrified waste + mineral waste (can contain some metals + contaminants)
  - Type C: incinerated wastewater treatment sludge + filters from waste incineration
  - Type D: incineration plant fly ash
  - Type E: asbestos + pipe clean-up + fire or flood waste

Who does what?

- The person who is required to remediate must :
  - Draw up the project and submitting it to the authorities
  - Plan and obtain the necessary permits
  - Remediation and monitoring
  - Document and report on the success of measures taken
- The cantonal environmental authority must:
  - Assess planned remediation measures
  - Set final goals
  - Decide on cost allocation
  - Comment on the success of the measures taken

General surveillance goals

- Ensure that it is possible to react appropriately in the event of unforeseen circumstances, to prevent further damage to the environment.
- Quickly identify any changes in the damage caused by a contaminated site and anticipate possible scenarios.
- Gather important data by:
  - taking and analyzing samples according to a program adapted to the particular case and the sanitization objectives
  - checking the operation of sampling points, such as wells and level or pressure measurement devices (piezometers), etc.
  - Clearly document results (report writing, archiving).

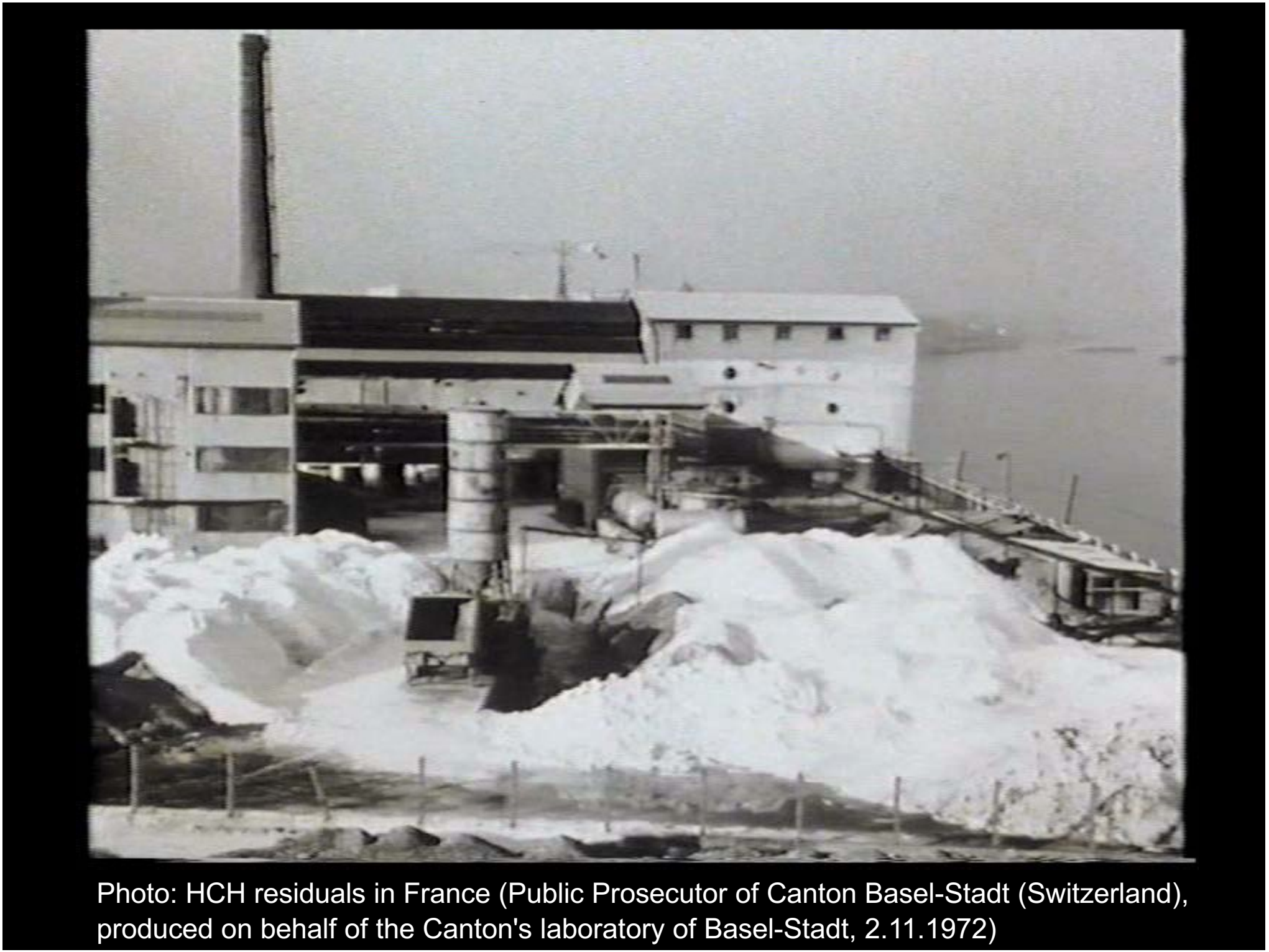


Photo: HCH residuals in France (Public Prosecutor of Canton Basel-Stadt (Switzerland), produced on behalf of the Canton's laboratory of Basel-Stadt, 2.11.1972)

Sandoz accident at Schweizerhalle 1986

Bonfol landfill

114,000 tonnes of chemical waste dumped in around 50 years by industry

Basel chemicals

Hazardous waste landfill in Kölliken

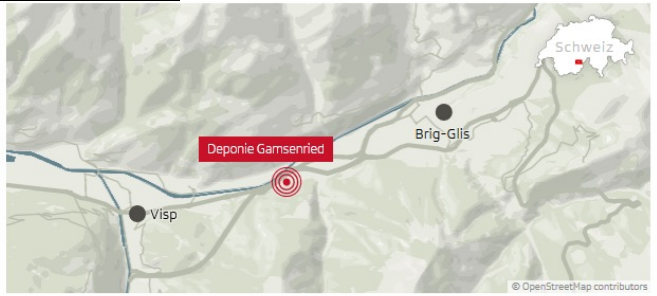
www.textatelier.com

Remediation in Kölliken

Des taux de benzidine dépassant les limites dans la décharge de Gamsenried (VS)

News from February 1, 2022

Des taux de benzindine dépassant les limites dans la décharge de Gamsenried (VS) / La Matinale / 1 min. / le 22 février 2022



- Detection of carcinogenic benzidine in two drinking water wells in October 2019
- Origin: Lonza waste deposited between 1918 and 1978
- Gamsenried landfill to be cleaned up

Seit 1918 existiert die Giftmülldeponie. Diese Fässer wurden im Jahr 1987 fotografiert.
KEYSTONE