

Cost- and time efficient site assessment: Two case studies with an interdisciplinary approach

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Network Oriented Risk assessment by Insitu Screening of Contaminated sites

2001-2003

Technology development project funded by the European Commission under the 5th Framework Programme

NORISC

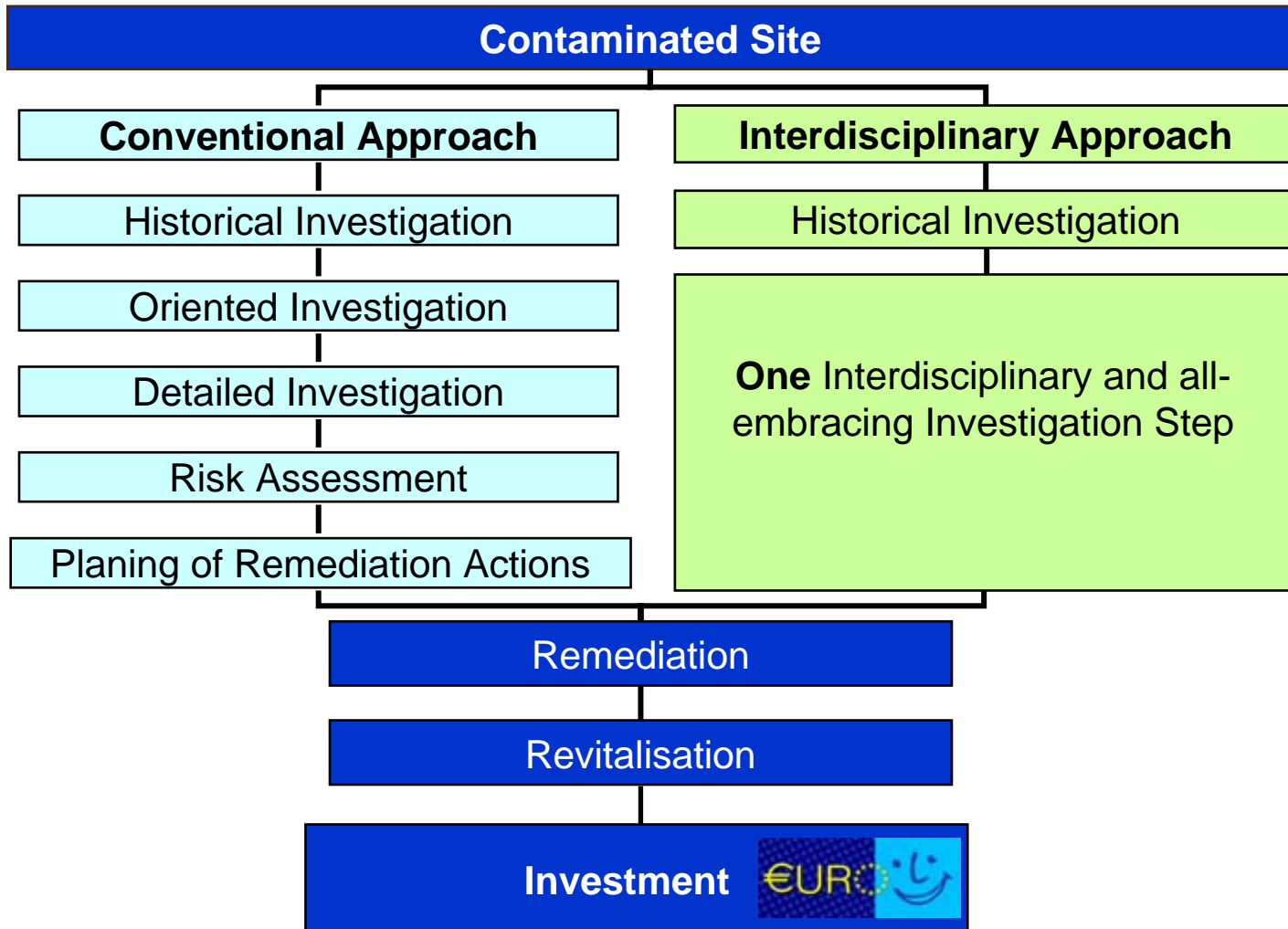
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Contact

Summary

The banner features a collage of images: a person in a yellow hazmat suit sampling soil, an excavator at a site, a large industrial facility with a tall chimney, a person using a laptop, and a map of Europe with a red dot indicating a site location.

Comparison of a Conventional Approach against an Interdisciplinary Approach



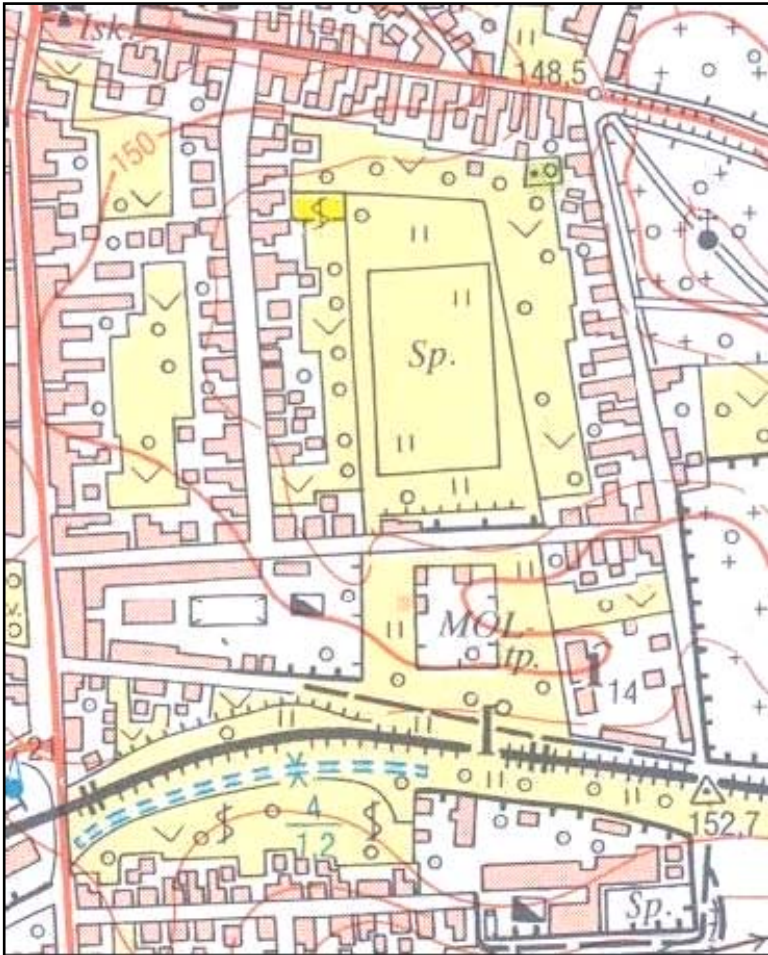
Methodical Development

Objectives of the Investigation

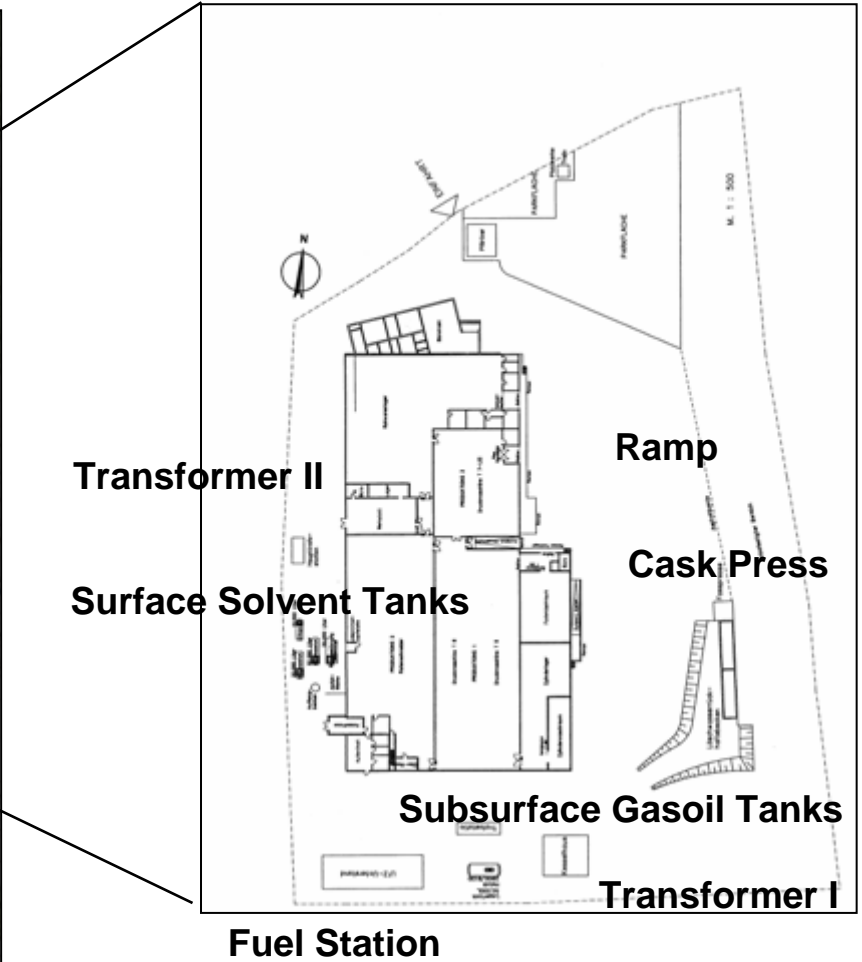
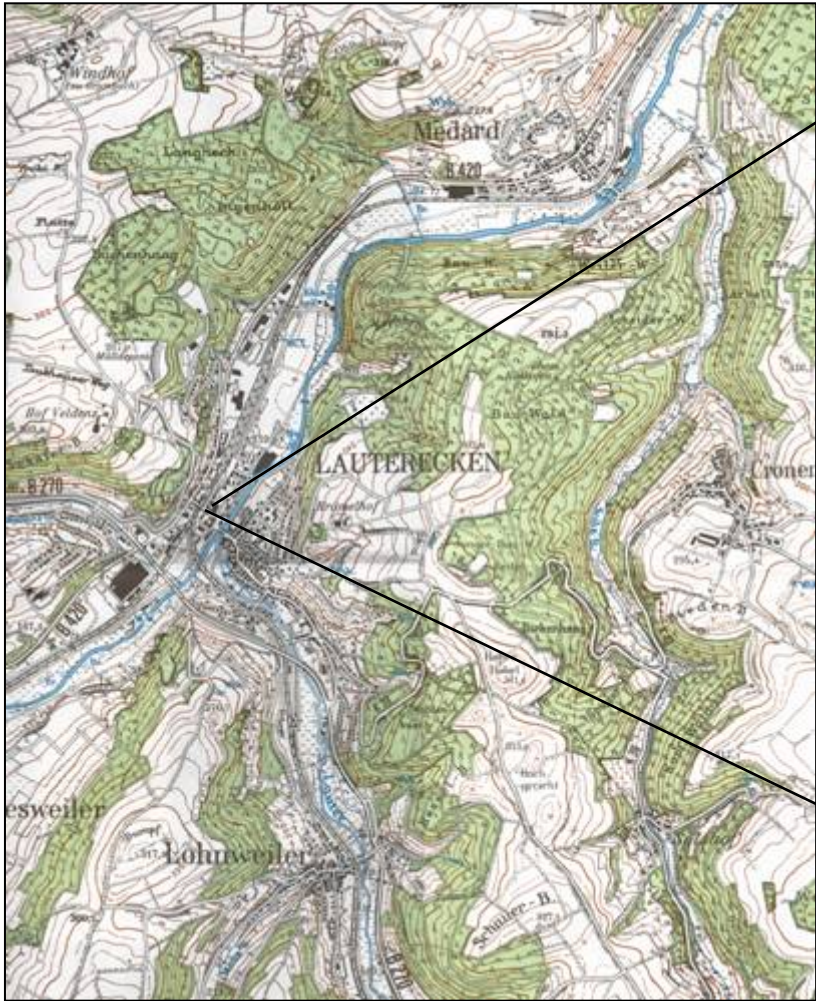
- Testing of On site methodology in practice.
- Interdisciplinary teamwork of different sciences in the field of contaminated land investigation (Geophysics, Hydrogeology, Geochemistry, Human Health Risk Assessment ...)
- Development and verification of a flexible investigation scheme
- Preference and testing of analytical techniques that can be brought on-site.
- Adaption and refinement of the site model on the demands of the stakeholders.
- Reporting of the investigation results and the evaluation of data..

	Lauterecken, Germany	Budapest, Hungary
Investigation	August 2004	September 2003
Site History	Packaging, Print and Paint Shop	Fuel Storage Electronic components
Size	2,5 ha	10 ha
Contaminants	TPH, BTEX, CHC	TPH, BTEX, CHC, Heavy Metals
Investigated Media	Soil, Soil Gas	Soil, Groundwater
Duration Field Work	3 Days	5 Days

Hungarian Test Site



German Test Site



Used On-Site Analytical Tools during the Field Studies

Contaminant	Investigated Media	Analytical Tool	Model	Producer
Heavy Metals	soil	XRF	Spectrum Analyser 7000er series	Niton Corporation
BTEX	soil, water, soil gas	GC/TCD	3000 Micro GC	Agilent Technologies
TPH	soil	Infrared- Photometer	Petroleum Hydrocarbon Analyzer TPH Plus	General Analytics Corporation
TPH	water	GC/FID	HP 5890 GC	Agilent Technologies
TPH	soil/water	UV-Fluorescence	TD-500	Turner Designs Inc.

Impressions from the Field Work I



Direct Push drilling and in situ sampling of ground water on PCE with Geoprobe®.



Daily visualisation of analytical data ensures flexible decisions during the investigation.



GC/FID analysis on TPH in laboratory truck.



Analysis of soil/soil gas samples with mobile GC/TCD.

Impressions from the Field Work II



Portable XRF for on-site analysis of Heavy metals in soil.



Mapping of lithography and ground water table with Reflexion Seismics.



Infrared-Photometer for TPH measuring in soil.



UV Fluorescence Meter for TPH and PAH measuring in soil and water.

- Approx. 54 Drillings - 50 mm
- 12 BTEX/CHC Analyses in Soil Gas
- 13 TPH Analyses in Soil
- 5 BTEX/CHC Analyses in Soil
- Field Investigations during 3 days, over the weekend. No inhibitions of production

Field Lab On Site in Lauterecken.



Storage Area



Advantages



- **On-site analysis delivers better results**, because of its flexibility. More samples may increase data quality, adapted approach is possible.
- **Fast correlation** of analyses and sampling data.
- **Use of Geophysics offers 3D-View of the underground** (identification of lithology, of aquifers, of non-geogenic objects ...).
- **Cost Reduction** with time saving and less lab analyses
- **More flexibility** by using on-site adaptable project management
- **Faster security** for investors.
- **Revitalisation** of contaminated sites in the urban areas \Rightarrow no more green space consumption.

The Limits



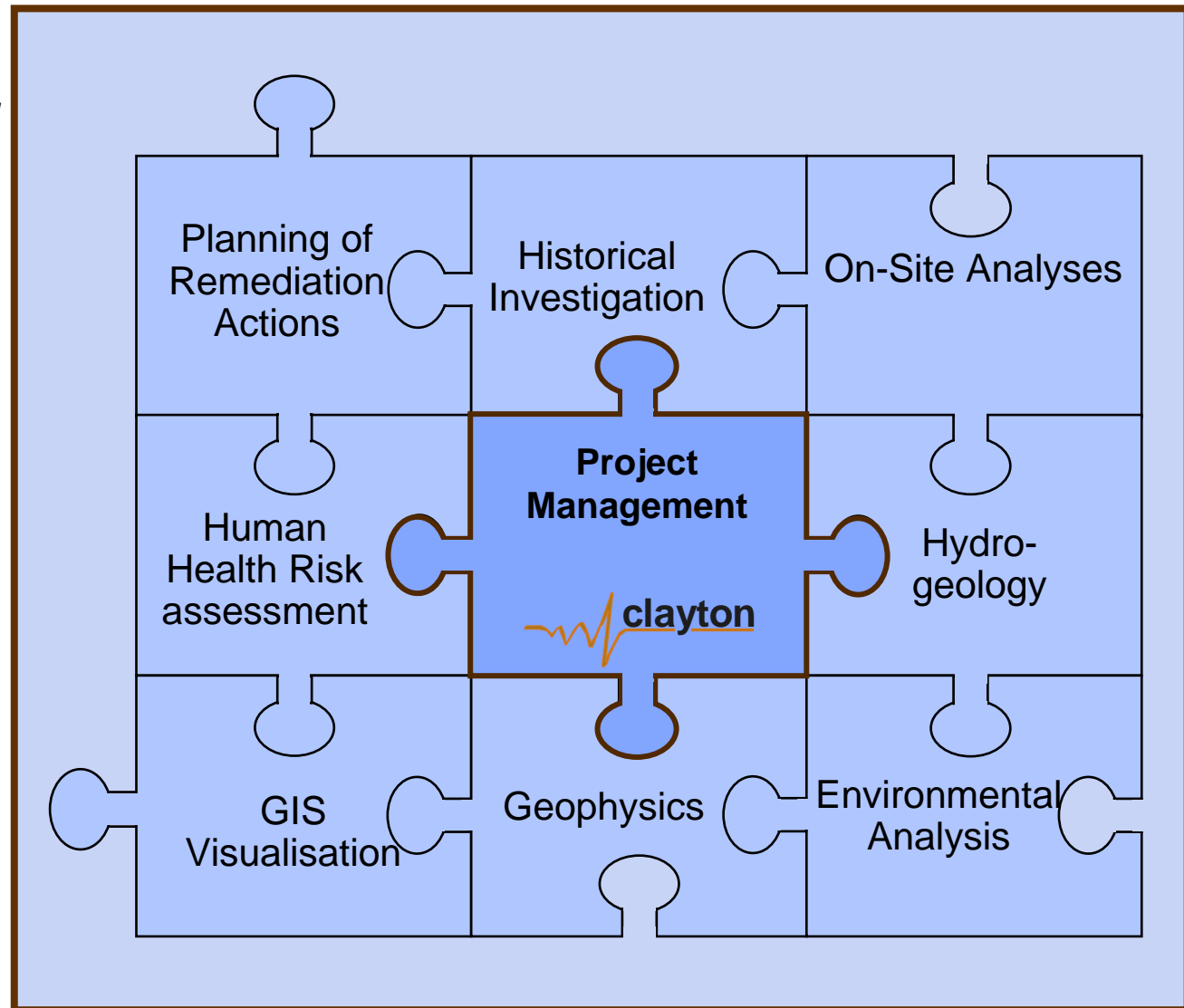
- **Investigated Site** needs a reasonable size
- **Not** suitable to all contaminants or „complex cocktails“
- **High** qualified Personal is essential
- **Analytical limits** do often not meet existing thresholds
- **Less acceptance** by regulators

Cost Reduction

	Lauterecken, Germany	Budapest, Ungarn
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Site History	Packaging, Print and Paint Shop	Fuel Storage Electronic components
Size	2,5 ha	10 ha
Contaminants	TPH, BTEX, CHC	TPH, BTEX, CHC, Heavy Metals
Investigated Media	Soil, Soil Gas	Soil, Groundwater
Duration	14 Days	20 Days
Overall Cost	11.400,- €	29.900,- €
Overall Cost conventional App.	20.000,- €	64.500,- €

Interdisciplinary Team Work *in the Field*

- **Daily discussions between the scientific disciplines**
- **Daily visualisation of data**
- **Daily planning and flexible adaption of the investigation strategy based on field results**
- **Central project management in a network approach**



Some aspects on Data Quality.

■ Data Quality = Should be assessed according to the ability of data to provide information that meets user needs

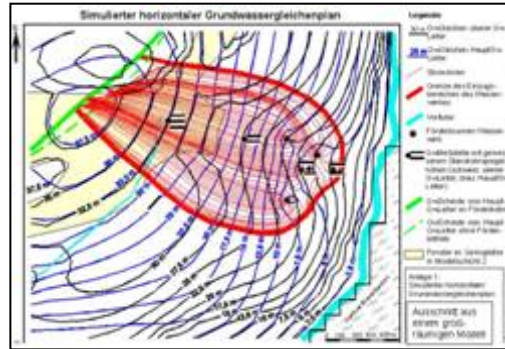
■ The repeat analyses result is the same, therefore it must be right ?

■ The more complex the sample matrix is, the larger is the likely bias

■ Sampling Uncertainties + Analytical Uncertainties = Uncertainty in Data Results



What do we have to consider ?



- **Only the excellent and detailed project planning and managing ensures the success of a combined** investigation, because the possibility of a second or third investigation step for getting missing data lacks.
- The use of on-site techniques and on-site decisions requires **best educated and experienced personal and quality management in the field** (Chemists, Toxicologist, Geophysists, Hydrogeologists, Environmental Engineers are **needed on-site** and not in the Office or Laboratory!).

***“Doubt is not a pleasant condition, but
certainty is absurd.”***

Voltaire

Humanist, rationalist, & satirist (1694 -1778)