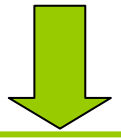
Riga, 14 October 2010

MANAGEMENT OF CONTAMINATED SITES IN GAS STATIONS MODERNIZATION PROGRAM

Who are we?

SNCF Technical Direction



Environmental Department

The scientific environmental experts team

Our role:

- To control the consulting firms realizing the environmental studies
- To advise the Project Supervisor or the suppliers.
- To manage all the environmental issues.
- To be auditor/guarantor of all aspects of regulations.

Why gas stations modernization program?

The gas stations sites in 2000

Why gas stations modernization program?

The gas stations sites in 2000

Why gas stations modernization program?

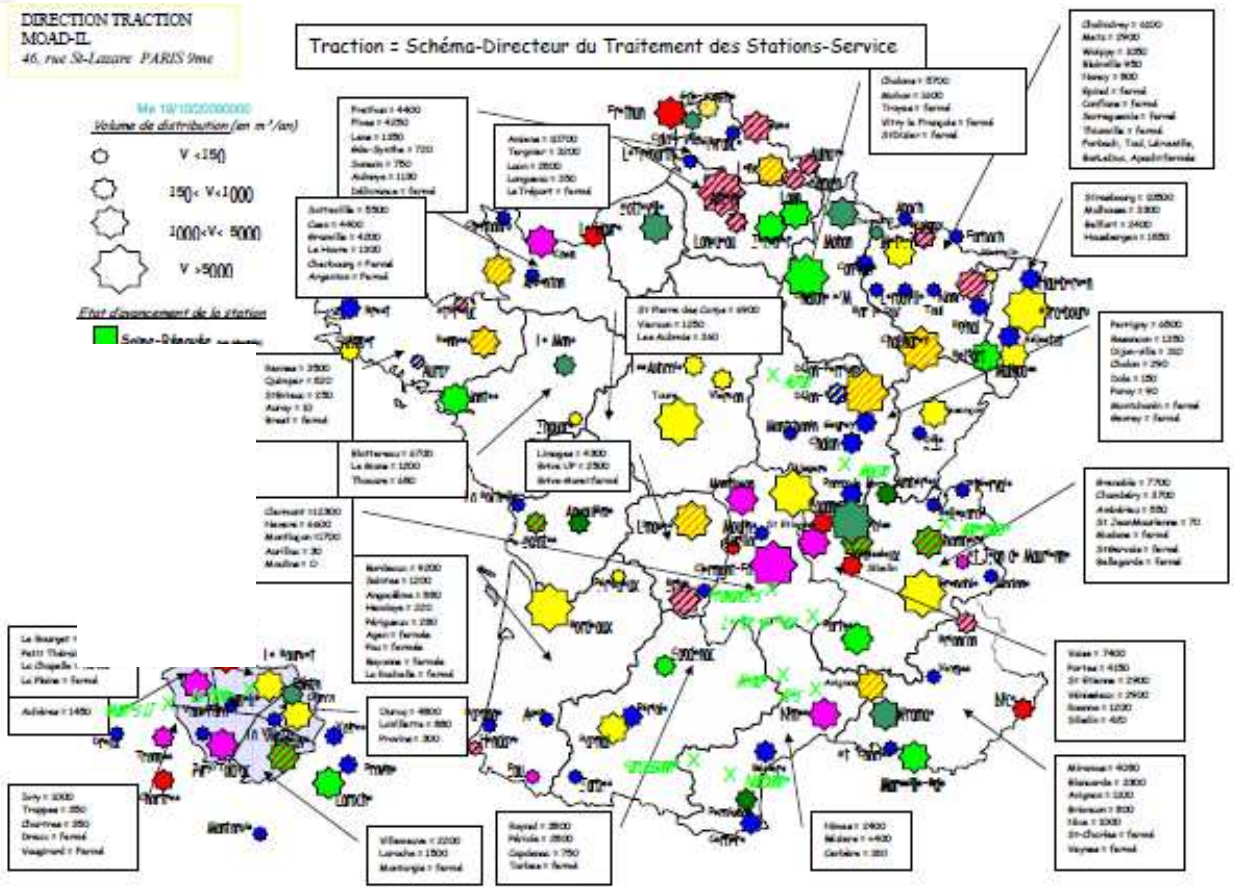
Furthermore...

- The production/needs evolution
  - The lines electrification,
  - The evolution of FRET
- The increased costs

- The environmental responsibility for the company

Why gas stations modernization program?

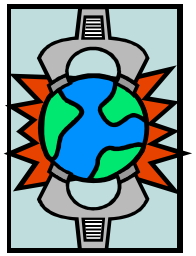
The gas stations network in 2000



Why gas stations modernization program?

A growing old 60's – 90's gas stations park

THE ENVIRONMENTAL PRESSURE



The program evolution

- 2000 – 2007

Emergency management site by site

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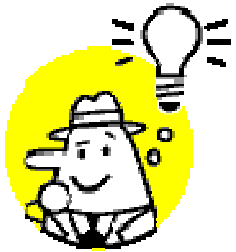
Costs and times overruns

- 2008 – 2015



CUTEEE Program = industrialization of gas station modernization

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Costs and times control

What does mean “CUTEEE”?

CUTEEE

=

Chantier d’Urgence Traction Economie d’Energie et Environnement

Energy Saving and Environment Emergency Works

The CUTEEE goals

1. **The rationalization of old gas stations network (from 120 to 70 stations) and ranking of priority sites**

2. **The modernization of the gas stations park**

3. **The environmental risk management**

The CUTEEE principal scenarios

1. Gas station modernization
2. Gas station creation
3. Gas station suppression

The most complex scenarios:

- Very important constraints
- Direct impact on site activity

Realization by phases

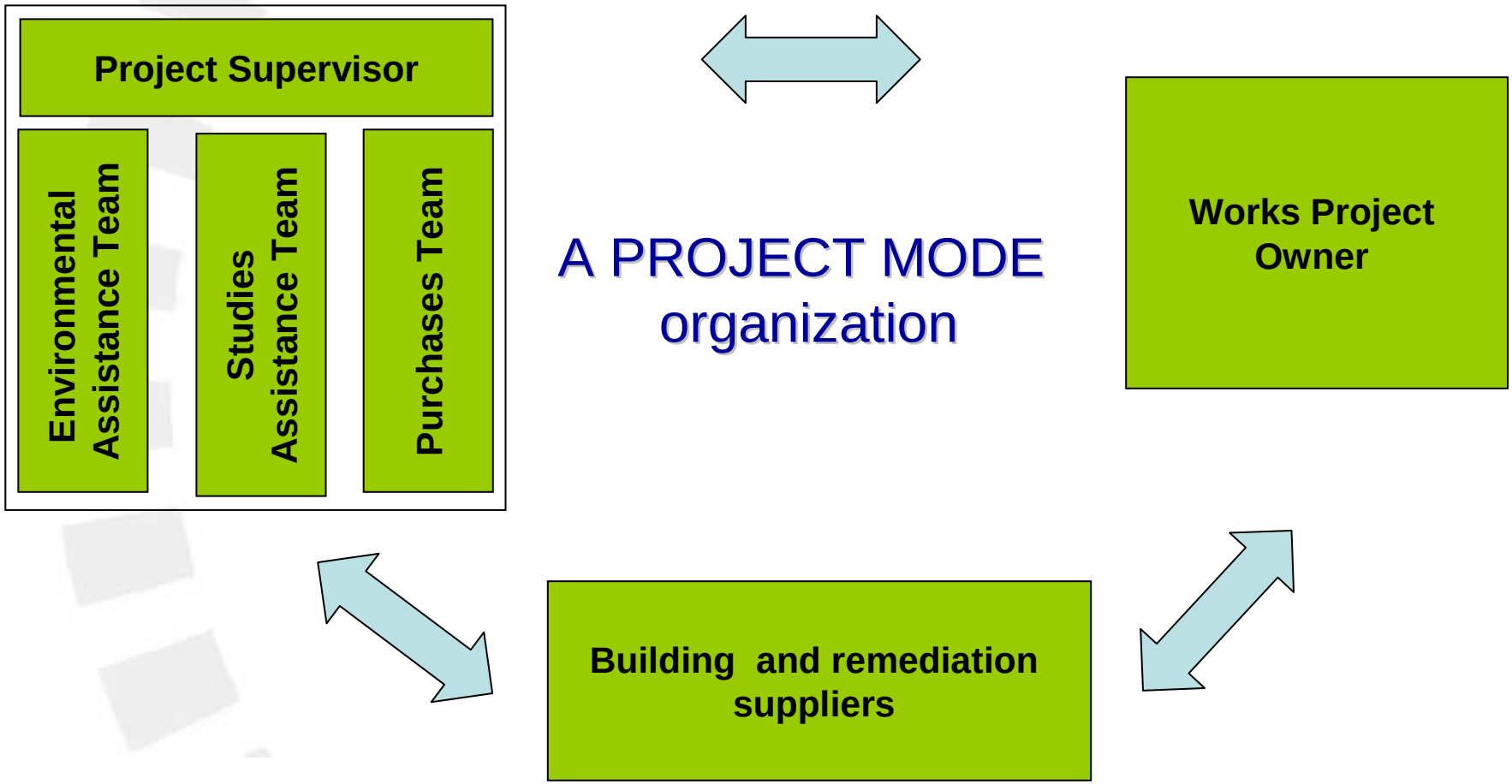
The CUTEEE budgets and times

Gas stations modernization budget: 100 M Euros

Sites remediation budget: 60 M Euros

Times: 7 years (2008 - 2015)

The CUTEEE organization



Environmental risk management approach

The steps of the environmental risk management:

1. The environmental study
2. The cost/benefit balance
3. The Request For Information (RFI)
4. The Remediation Market
5. The project realization
6. The work receipt

Environmental risk management approach

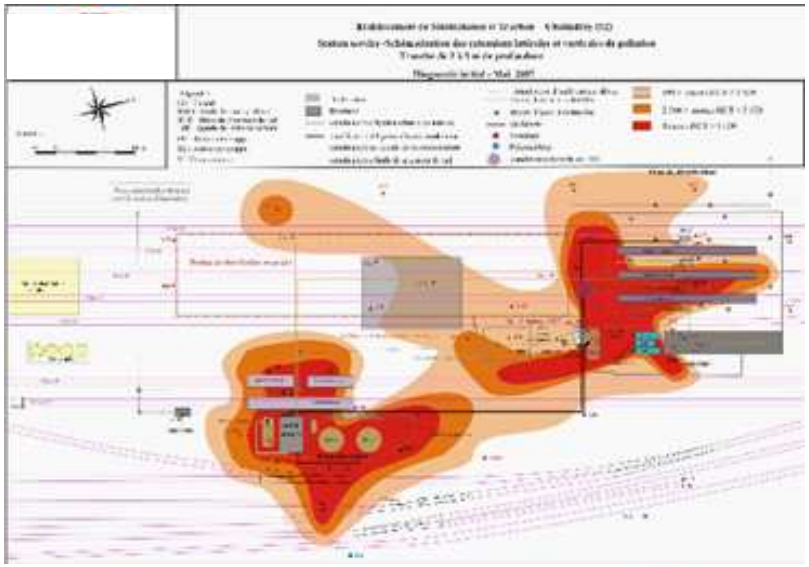
1. THE ENVIRONMENTAL STUDY

French environmental policy method:

1. Detailed historical and documentary study and field inspection of the site.

2. Soil survey/piezometers + soil/groundwater sampling + chemical analysis (gas oil tracer: C10-C40).

Soils and groundwater pollution map

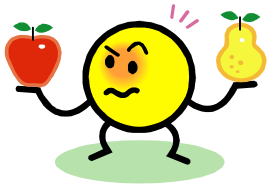


The environmental study times: 3 months

2. THE COST/BENEFIT BALANCE

Development of remediation scenarios depending of:

- Pollution level.
- Kind of project (gas station dismantlement or renovation).
- Operating constraints of the railway infrastructure.
- Kind of remediation (in-site or ex-site treatments).



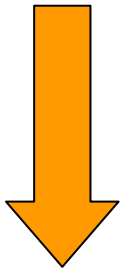
The cost/benefit balance times: 9 months

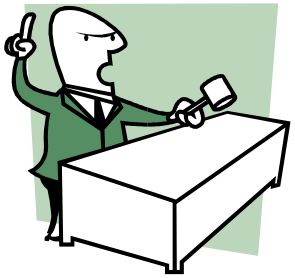
Environmental risk management approach

2. THE COST/BENEFIT BALANCE

Before project phase:

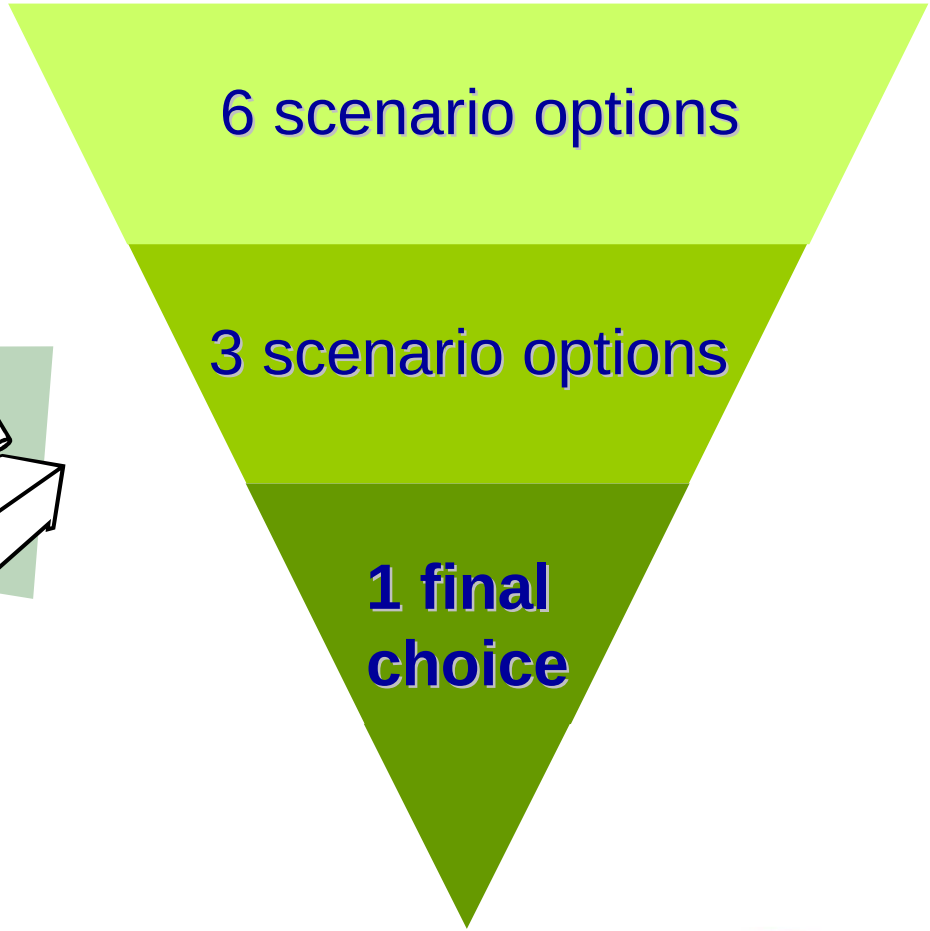
6 months studies





In the project phase:
3 months studies for choosing

The best strategy

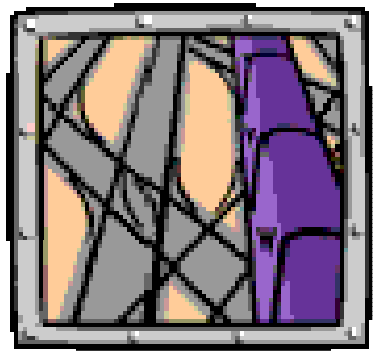


Environmental risk management approach

2. THE COST/BENEFIT BALANCE

How is the final strategy chosen?

- Cost (compared with the spending priority sites list).
- Operating constraints of the railway infrastructure.
- Future use of the site.
- Regulatory framework.
- Third-party environmental risk.



3. THE REQUEST FOR INFORMATION (RFI)

Definition of:

- *Perimeter of the remediation.*
- *Kind of remediation.*
- *Targets in terms of thresholds and volumes of remediation.*

4. THE REMEDIATION MARKET

The market strategy:

Choice of the cheapest supplier of a known suppliers panel specialized on soils remediation.

The market times: 4 months

Environmental risk management approach

5. THE PROJECT REALIZATION

Before the remediation works:

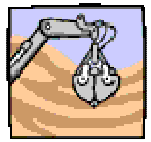
Debate between the Project Supervisor (assisted by IGLGEnv) and the supplier to quantify the unforeseen.

For exemple: discovery of larger volumes of polluted soils.

Establishment of work breakpoints to acquisition of additional input data to decide if to exceed the initial budget or target only the most impacted areas.

(Cost/benefit balance update).

Environmental risk management approach



Environmental risk management approach

6. THE WORKS RECEIPT

Characterization of residual pollution to calculate the risk associated.

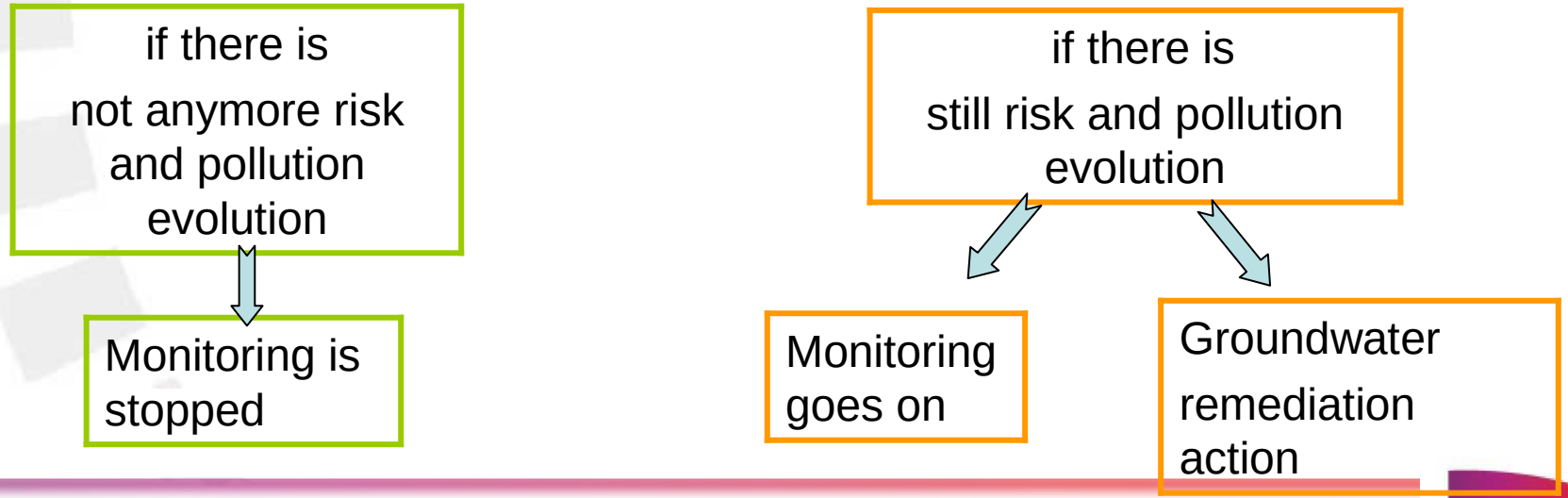
Realized by a third party consulting firm independent from SNCF and the suppliers.

Environmental risk management approach

6. THE WORKS RECEIPT

- Realization of chemical analysis of unexcavated soils
- Risk Calculation
- Groundwater Monitoring and/or other precautions:

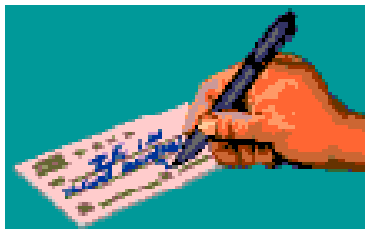
After the quadrennial review



Environmental risk management approach

What remains to be done:

1. To organize :
   a) *the memory backup (traceability) of remediation works and residual pollution.*
   b) *Later remediation works (after 2015)*



2. To decide which entity has to provision any later remediation works.

   The Real Estate Direction?

In situ *remediation applied research*

Why the program:

The exorbitants costs of some sites

The polluted soils excavation
=
major constraints to railway operations, removal and laying of rails, preparation works
=
30 – 60 % of additional remediation costs

The in-situ remediation
=
a lot of difficulties due to
- Railway site nature.
- Polluant nature (degraded fuel).
- Site activity.

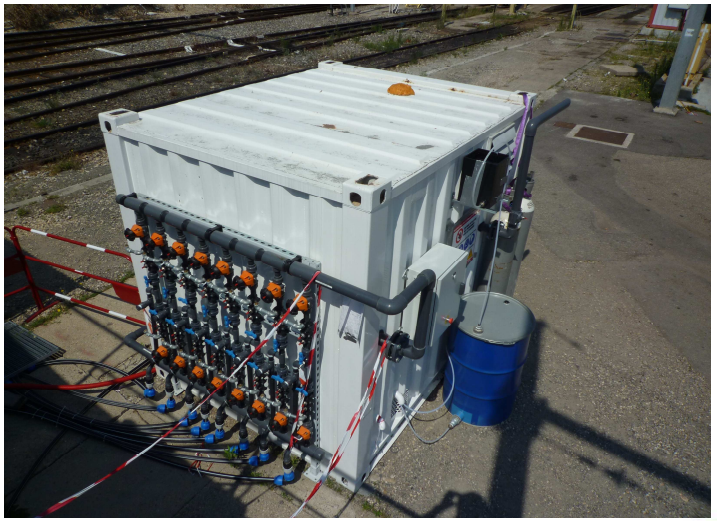
=
Low reliability
Poor results

In situ *remediation applied research*

The program approach:

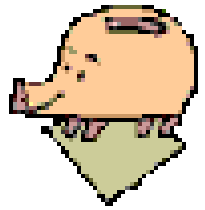
- 2 pilot sites.
- 3 techniques tested
  - Biological treatments (in the vadoes zone):
    - *Bioventing + nutrients,*
    - *Bioventing + nutrients + hot air injections (50° - 60°C).*
  - *Pollutes soils chemical oxidation:*
    - *Hydrogen peroxide injections,*
    - *Ozone gas injections.*
  - *Polluted soils flushing.*

In situ *remediation applied research*

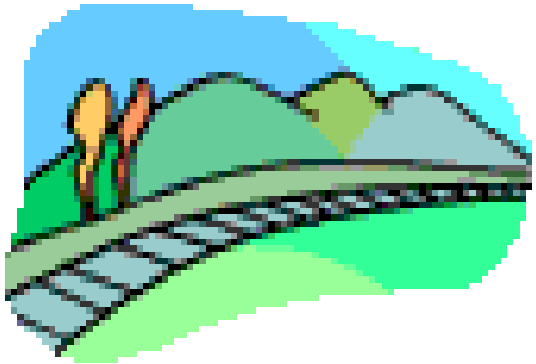


In situ remediation applied research

The goal



How to master better the techniques in order to buy them better




Thank You

In situ *remediation applied research*

Technique	Results
Bioventing + nutrients	we do not have results yet
Bioventing + nutrients + hot air injections	
Hydrogen peroxide injections	Pollution reduction : 34% Action ray: 0,6 m
Ozone gas injections	Pollution reduction : 27% Action ray: 0,5 - 1 m
Soils flushing	Pollution reduction : 50 – 60%

In situ *remediation applied research*

The program approach:

- Biological treatments (in the vadoes zone) = the polluants are broken down by bacteria, usually aerobic.

  Bioventing = aerating soils to stimulate the biological activity to maximize the biodegradation.

  - *Bioventing + nutrients (Nitrogen, phosphorus, sulfur and other nutrients to support good microbial growth),*
  - *Bioventing + nutrients + hot air injections (50° - 60 °C).*
- Pollutes soils chemical oxidation = the polluants are changed into harmless chemicals
  - *Hydrogen peroxide injections,*
  - *Ozone gas injections.*
- Polluted soils flushing = extraction of polluants using water eventually with a solvent. Contaminats that are dissolved in the flushing solution are leached into groundwater which is extracted and trated.