

“Environmental Decision Support
Systems; Truth or Dare!”

NICOLE Network Meeting

8-10 October 2008

Madrid, Spain



Reference Framework for the reutilization of waste in contact with soil in the Basque Country (Spain)

Roland Cesarz

Germán Monge Ganuzas



Engineering, Architecture, Consulting



- Offices in 12 countries
- 15 offices in Spain
- Projects in more than 100 countries

- Belgium
- Brazil
- Canada
- Spain
- United States
- Morocco
- Mexico
- Poland
- Portugal
- United Kingdom
- Rumania
- Venezuela



- Minneapolis
- Richmond
- Calgary



- Derbyshire
- Kent
- Cardiff
- Wiltshire



▪ Recent acquisitions:

- Industrial Engineering
- Consultancy and Systems
- Architecture and Construction
- Civil Engineering
- Telecommunications
- The Environment
- Advanced Technologies
- Turn-Key
- ...



The project

Reference Framework for the reutilization of waste in contact with soil in the Basque Country (Spain)

is realized in collaboration with



MAS - Lawyers

and financed by

The Environmental Agency of the Basque Country



The Department of Environment and Regional Planning of the Basque Government



INGURUMEN ETA LURRALDE
ANTOLAMENDU SAILA

DEPARTAMENTO
DE MEDIO AMBIENTE
Y ORDENACIÓN DEL TERRITORIO





Introduction

Applied Methodology

Phase I: Prospective European study

Phase II: Environmental evaluation

Phase III: Elaboration of the Reference Framework



European environmental policy:

=> Increase recycling and protect the soil

Problem

Lack of

- well defined regulatory space
- Sustainable management of the environment and it's resources
- various barriers



Barriers

Legal
Legislative
Technical
Economic



Environmental control
Soil and water protection
Poor social prestige

High demand
for aggregates

Towards Implementation of the Reference Framework

- Simple
- Adaptable to future circumstances
- Approach agreeable to all stakeholders
- Based on Consensus
- Raise public awareness on actual risks, costs, benefits
- Developing new technologies, tools and services

Phase 1



- Construction and Demolition waste (C&D)
- Steel slags from electric arc furnaces (EAF)
- Slag from the Waelz furnace
- Foundry sand
- Slag from the incineration of municipal solid waste (MSW)

Identification of the most important waste streams

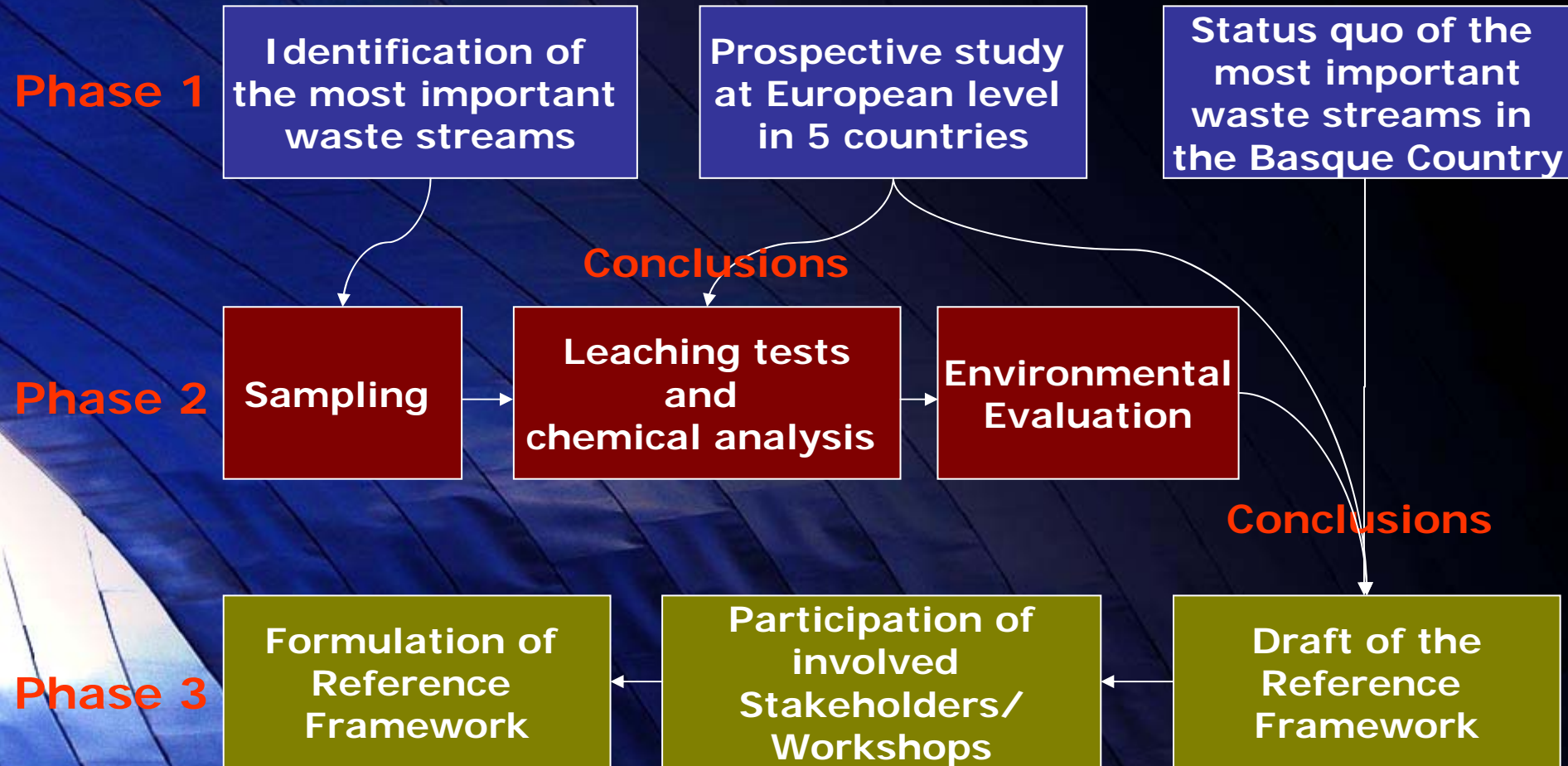
Prospective study at European Level in 5 countries

- Germany
- The Netherlands
- United Kingdom
- Denmark
- Belgium - Flemish Region





Applied methodology for the Reference Framework



Prospective study at European Level in 5 countries



- Literary Investigation
- Collecting useful Information and focusing on
 - Legislative framework
 - Regulated applications
 - Control parameters
 - Environmental control and Monitoring
 - Environmental evaluation system
- Identification of useful contacts
- Visiting and Interviewing the contacts

Status quo of the most important waste streams in the Basque Country

- Revision of the legal framework
- Current situation of each waste stream
- Determination of the most relevant barriers



Conclusions for the Basque Country

- Implementation of a certification system
- Promote recycling with helpful tools and financial incentives
- Establish conventions between the administration and the industry
- Development of a general framework including altered soils
- Design simple procedures and easy to use
- Participation of all involved parties
- Use of the Dutch environmental evaluation system

Phase 2

Heavy Metals, PAH, PCB, TPH, TOC, BTEX y HCH

Leaching tests and chemical analysis

Characterizing the composition and the leaching



Sampling

Heavy Metals, PAH, PCB, TPH, Phenols, Cyanide, Chloride, Fluoride, Sulphate, Bromide Conductivity, pH, Redox potential, COD y EOX

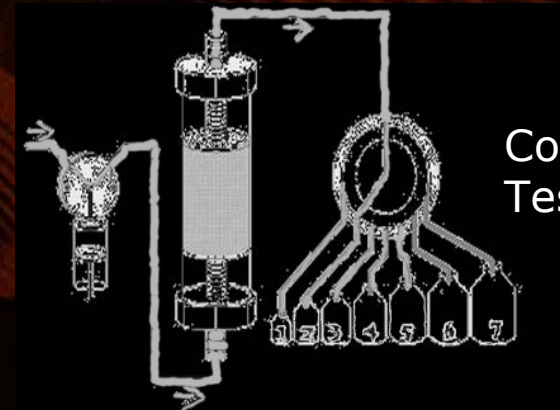
96 samples in 12 plants/sites



Leaching tests applied



Test with agitation



Column Test

Tank test



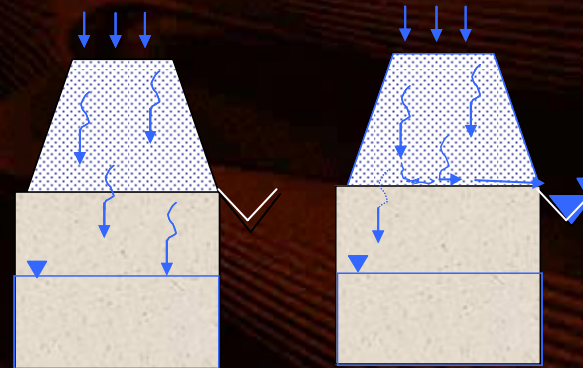


1. Calculation the **maximum acceptable Immission values**

$$I_{\max} = \frac{\alpha}{100} \cdot T_s \cdot d \cdot h$$

α = increment of 1%
 T_s = Reference soil value
 P = soil density
 h = thickness of soil

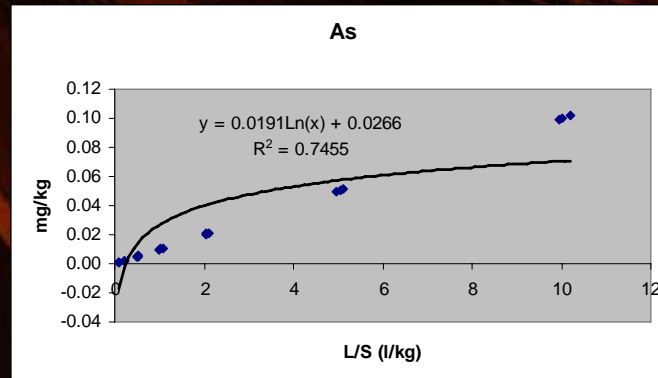
2. Definition of **application scenarios**



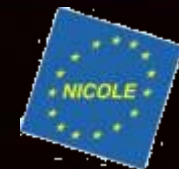
Immission to soil

Immission to water

3. Modelling the **Emmision for 100 years**



Example for arsenic



4. Calculation of Immission values

$$I_i = d \cdot h \cdot E_{100\text{years}} - I_{\text{soil}}$$

d = density material
 h = thickness of application
 $E_{100\text{years}}$ = Emmision of 100 years
 I_{soil} = Immission of soil

5. Comparison of Immission Values / maximum acceptable Immission Values

| Inf. mm/año | Inmisión total a 100 años (mg/m2) | | | Valores de la Inmisión máxima para el uso en o sobre el suelo |
|---------------|-----------------------------------|-----------|-----------|---|
| | 1165 | 1165 | 1165 | |
| Altura, h (m) | 1 | 0.5 | 0.3 | CAPV |
| Arsénico | VALIDO | VALIDO | VALIDO | 345 |
| Bario | VALIDO | VALIDO | VALIDO | 2250 |
| Berilio | | | | |
| Cadmio | NO VALIDO | NO VALIDO | NO VALIDO | 12 |
| Cromo | NO VALIDO | VALIDO | VALIDO | 795 |
| Cobalto | VALIDO | VALIDO | VALIDO | 300 |
| Cobre | NO VALIDO | NO VALIDO | NO VALIDO | 360 |
| Mercurio | NO VALIDO | NO VALIDO | NO VALIDO | 4.5 |
| Molibdono | NO VALIDO | NO VALIDO | NO VALIDO | 15 |
| Niquel | VALIDO | VALIDO | VALIDO | 600 |
| Plomo | VALIDO | VALIDO | VALIDO | 660 |
| Antimonio | NO VALIDO | NO VALIDO | NO VALIDO | 39 |
| Selenio | NO VALIDO | NO VALIDO | VALIDO | 15 |
| Estaño | VALIDO | VALIDO | VALIDO | 300 |
| Talio | | | | |
| Vanadio | VALIDO | VALIDO | VALIDO | 1020 |
| Cinc | VALIDO | VALIDO | VALIDO | 1560 |
| Cianuros | NO VALIDO | NO VALIDO | NO VALIDO | 1.5 |
| Bromuros | NO VALIDO | NO VALIDO | NO VALIDO | 300 |
| Cloruros | NO VALIDO | NO VALIDO | NO VALIDO | 233000 |
| Fluoruros | VALIDO | VALIDO | VALIDO | 7500 |
| Sulfatos | NO VALIDO | NO VALIDO | NO VALIDO | 291250 |

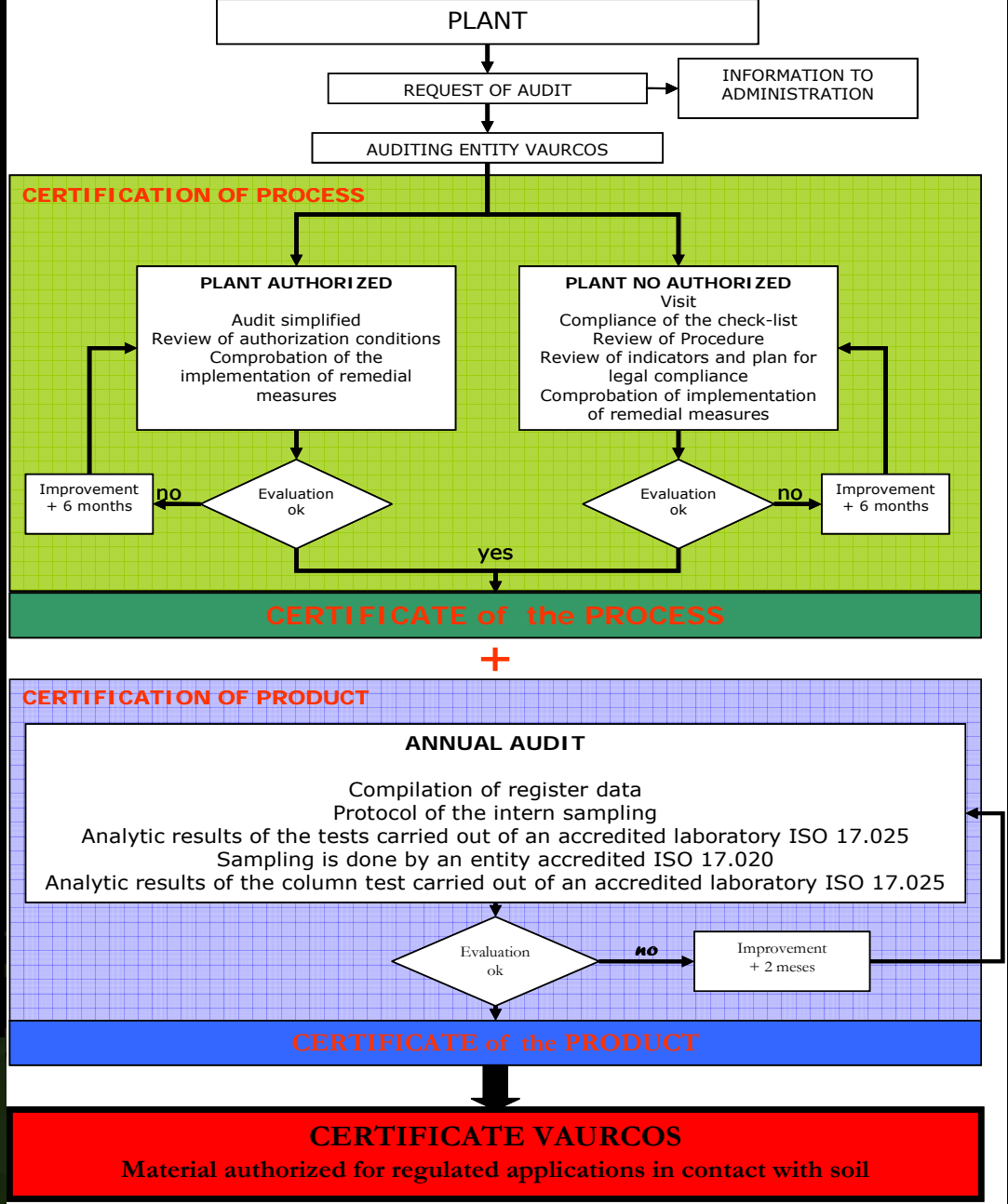
6. Derivation of Reference Values

Analysis and evaluation of the results

Phase 3

Draft of the Reference Framework

The plant has to pass 2 Audits (Process and Product) to obtain the Certificate VAURCOS





Draft of the Reference Framework

- Every authorized application needs its own Certificate VAURCOS
- The plant needs to establish procedures (registers) for the operational control
- Plants with ISO 14.001 or EMAS have a simplified Audit

| Tipo de Material | Task | Test | Minimum Frequency |
|-------------------|--|-----------------|-------------------|
| Granulates | Audit of the product/ External Control | NEN 7.373 | Every Year |
| | | Solid Phase | Every Year |
| | Control continuos/internal | UNE-EN 12.457-4 | Every month |
| Monolithic | Audit of the product | NEN 7.375 | Every Year |
| | | Solid Phase | Every Year |

Participation
of the
involved
Stakeholders



Discussion of the Draft in Workshops with the
involved Stakeholders

Formulation
of Reference
Framework

Implementation of the proposed changes
and contributions



Challenges

- Encourage technology supply into market
- Stimulate positively that certain waste type do not terminate in landfilling sites
- Including altered soils and cleaned soils in the Reference framework



A Reference Framework offers sustainable solutions and environmental improvements.

Thank you very much for your attention!



Engineering, Architecture, Consulting

