

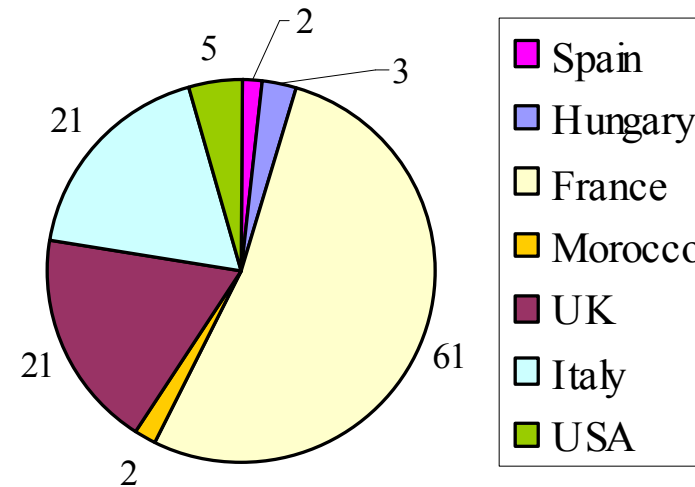
# Implementation of Nol Ring Test on Field

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# Sampling Campaign



## Participation of 7 BU's

- LDE (Fr), United Water (US), Northumbrian Water Ltd (UK), Agbar (Es), Nuove Acque (It), Budapest Water Works (Hungary), Lydec (Morocco)

## 115 pipes sampled on 22 different sites

- According to disinfectant nature, laying date, material type, geographical localization and water quality parameters
- Numerous pipe dimension and deterioration level

# Degradation State Assessment by Nol Ring test

Definition of the NRR Index for sample degradation assessment

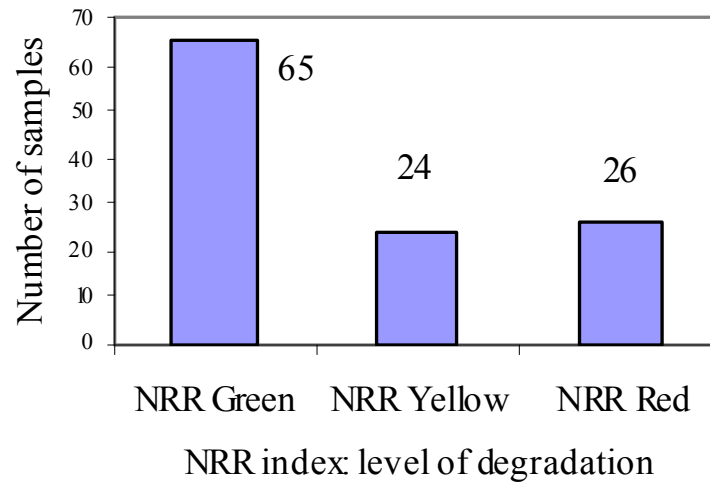
- NRR index based on Nol Ring aspect classification and elongation at break

| Degradation Index | Green Level                       | Yellow Level                              | Red Level                        |
|-------------------|-----------------------------------|---|----------------------------------|
| NRR               | [Aspect] < 2<br>AND<br>A% > 1500% | [Aspect] = 2<br>OR<br>1500 % ≤ A% < 1100% | [Aspect] > 2<br>OR<br>A% ≤ 1100% |

- Green Level:** No Deterioration
- Yellow Level:** Limited Deterioration
- Red Level:** High Deterioration

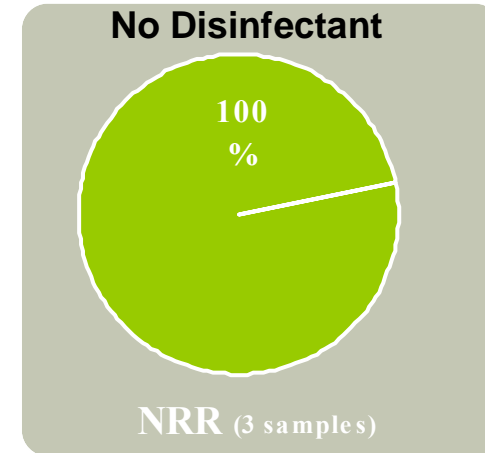
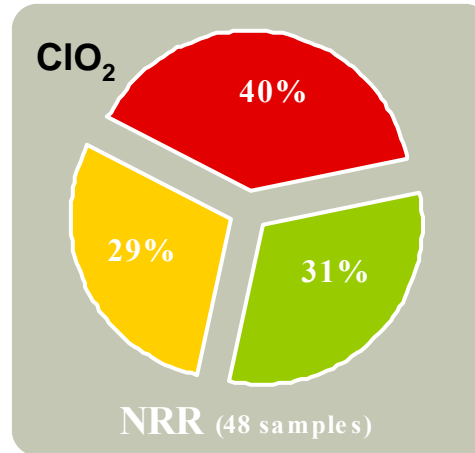
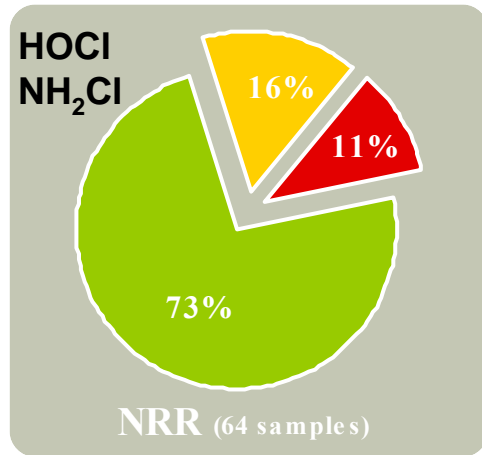
# Main Results

Ranking of field samples



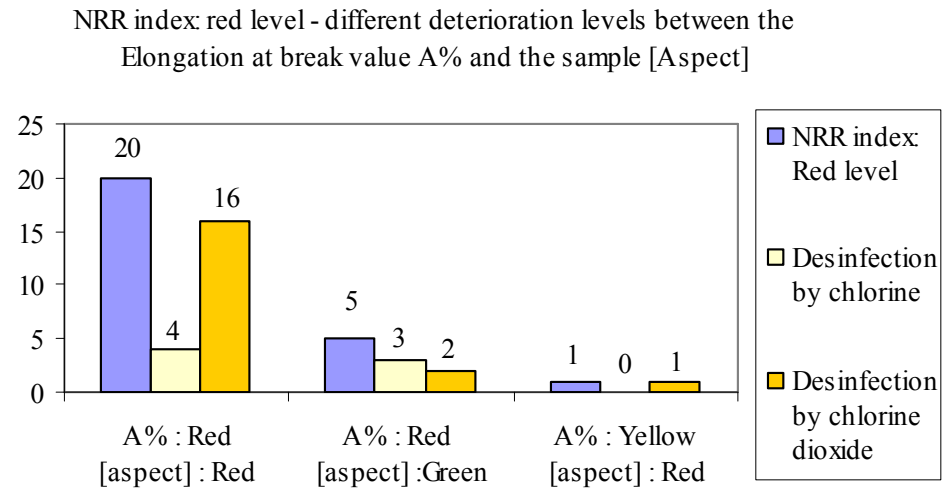
- No deterioration for a majority of the samples
- Moderate to high degradation for 39 % of the samples

## Main Results – Classification per disinfectant



- For HOCl a majority of the pipes is no degraded
- For ClO<sub>2</sub> Nol Ring test shows worrying results
- Nol Ring results highlight the impact of disinfectant

# Main results – Aspect & Elongation



- All the samples with deteriorated aspect present low elongation
  - Shows the impact of oxidative degradation
- Samples with non deteriorated aspect can have low elongation
  - Could prove low material quality