

# An overview of uranium mining in France with focus on the Limousin region

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Système de management  
de la qualité IRSN certifié

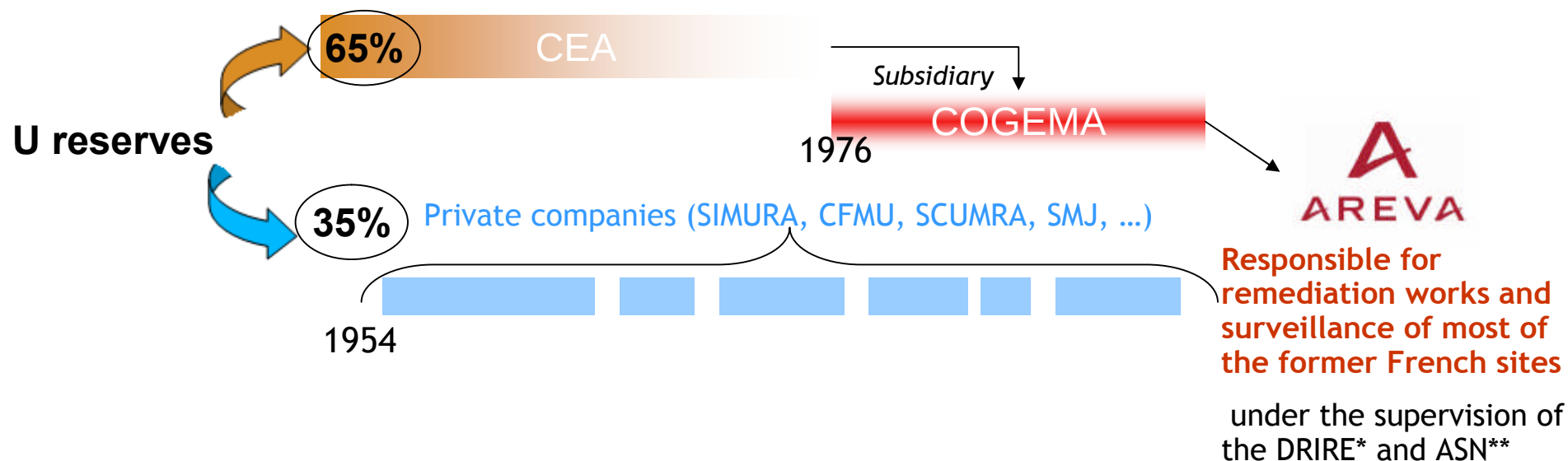
# History of uranium mining in France

Henriette  
1<sup>st</sup> mine : 1948

Jouac  
Last mine : 2001

2<sup>nd</sup> world war

50 years of mining works



\*Local technical support organisation for the Ministry of Environment

\*\* Nuclear Safety Authority

# Localization of uranium mining sites in France

## 210 mine sites

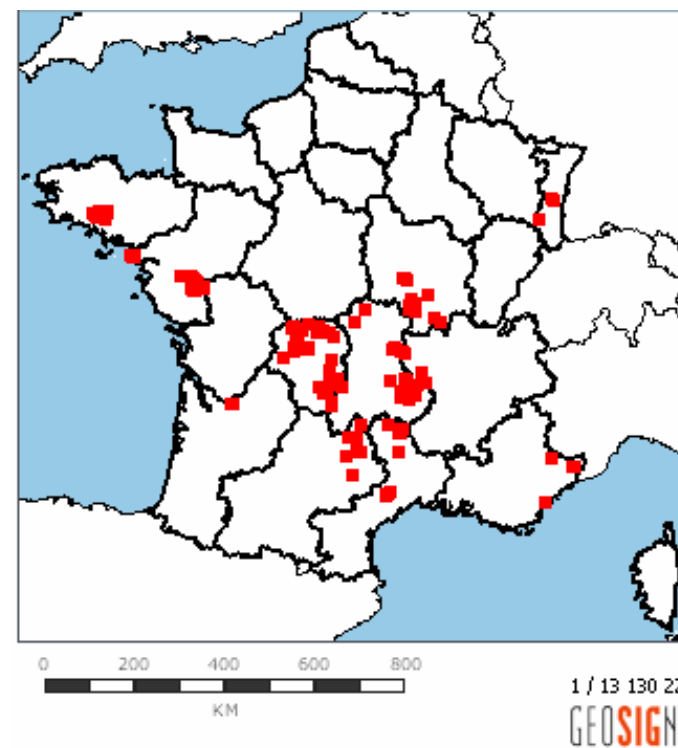
### Working period : 1948 -2001

- 76 000 tons of U
- ~ 50 000 000 tons of ore
- ~ 200 000 000 tons of waste rock

## 17 uranium tailings repositories

- Tailings : ~ 50 000 000 tons

### Remediation work period : 1995 - 2001+



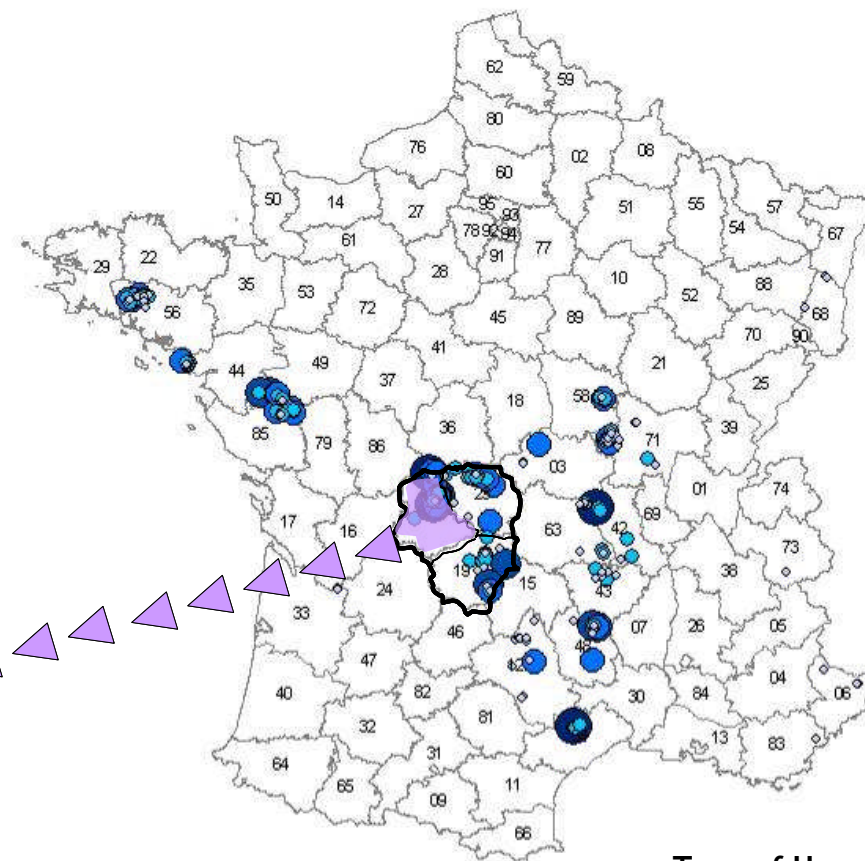
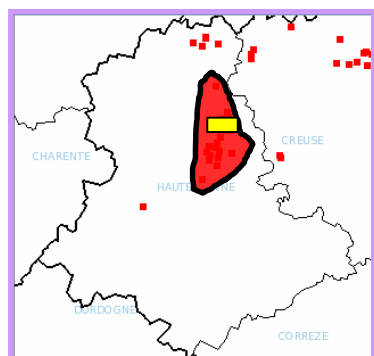
## Localization of uranium mining sites in Limousin region

Haute Vienne district

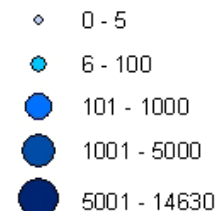
40% of the French production

Crouzille Mine Division :

- 24 sites 
- 4 tailings repositories 

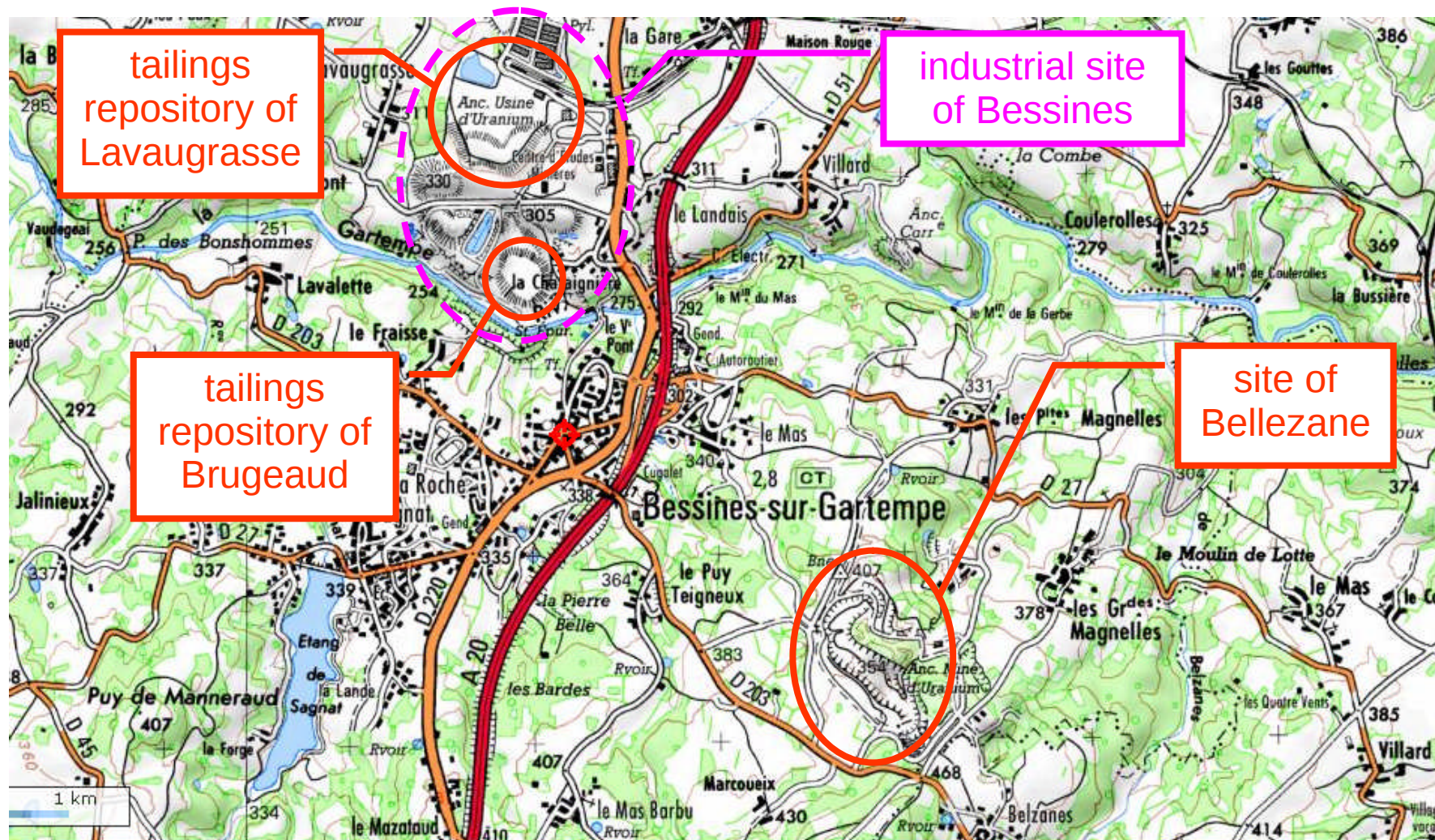


Tons of U produced

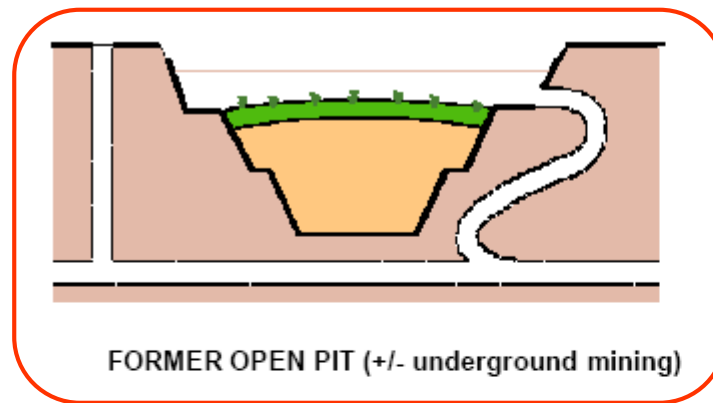


Most of the remediation works finished in 2003

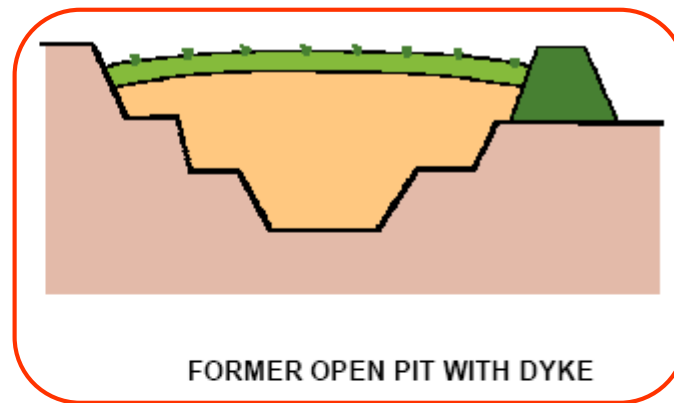
## Localization of the sites we will visit (inside the Crouzille Mine Division)



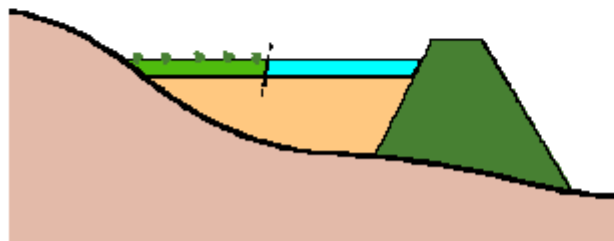
## Different types of tailings repositories in France



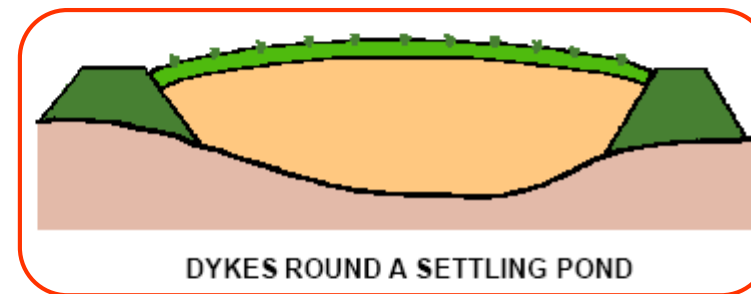
( Ex : Bellezane - Cellier )



( Ex : Brugeaud - Montmassacrot - Lodève )

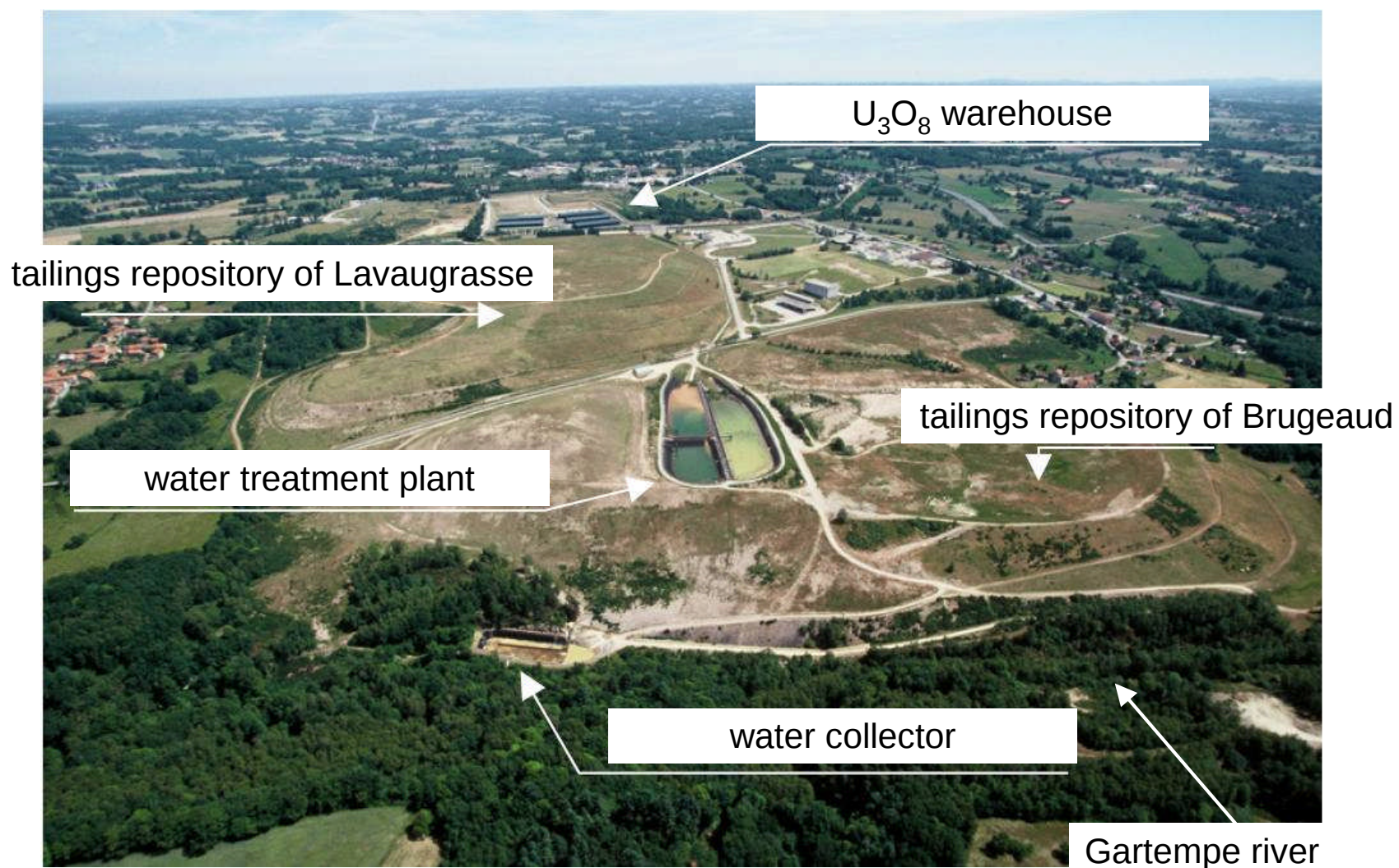


( Ex : Forez - Bertholène )

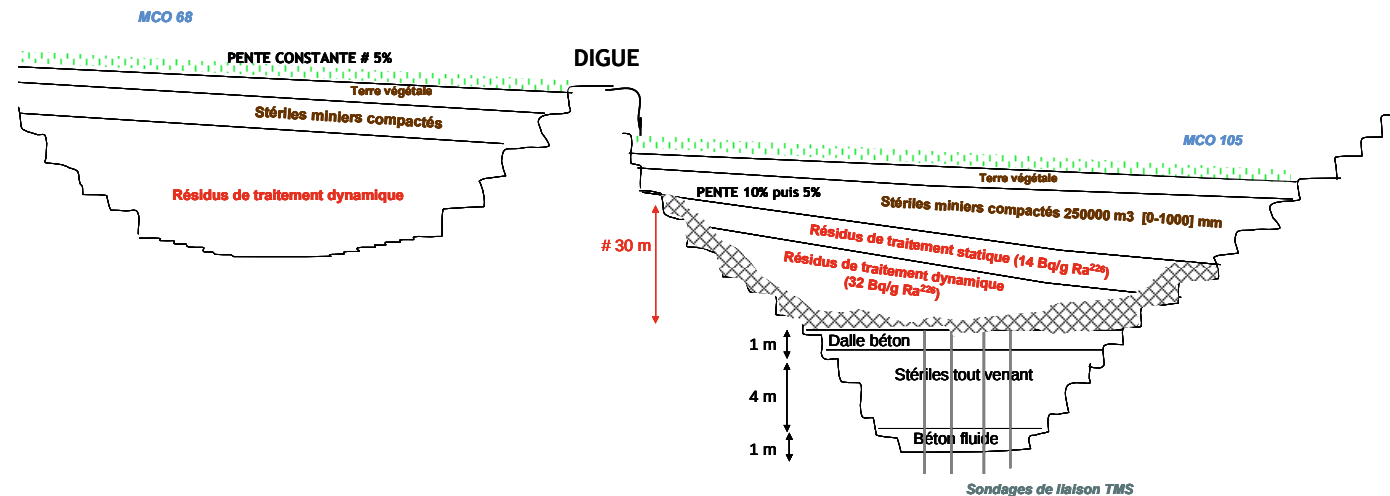


( Ex : Ecarpière - Jouac - Lavaugrasse )

## Industrial site of Bessines (Lavaugrasse and Brugeaud)



## Site of Bellezane (tailings repository near Bessines)



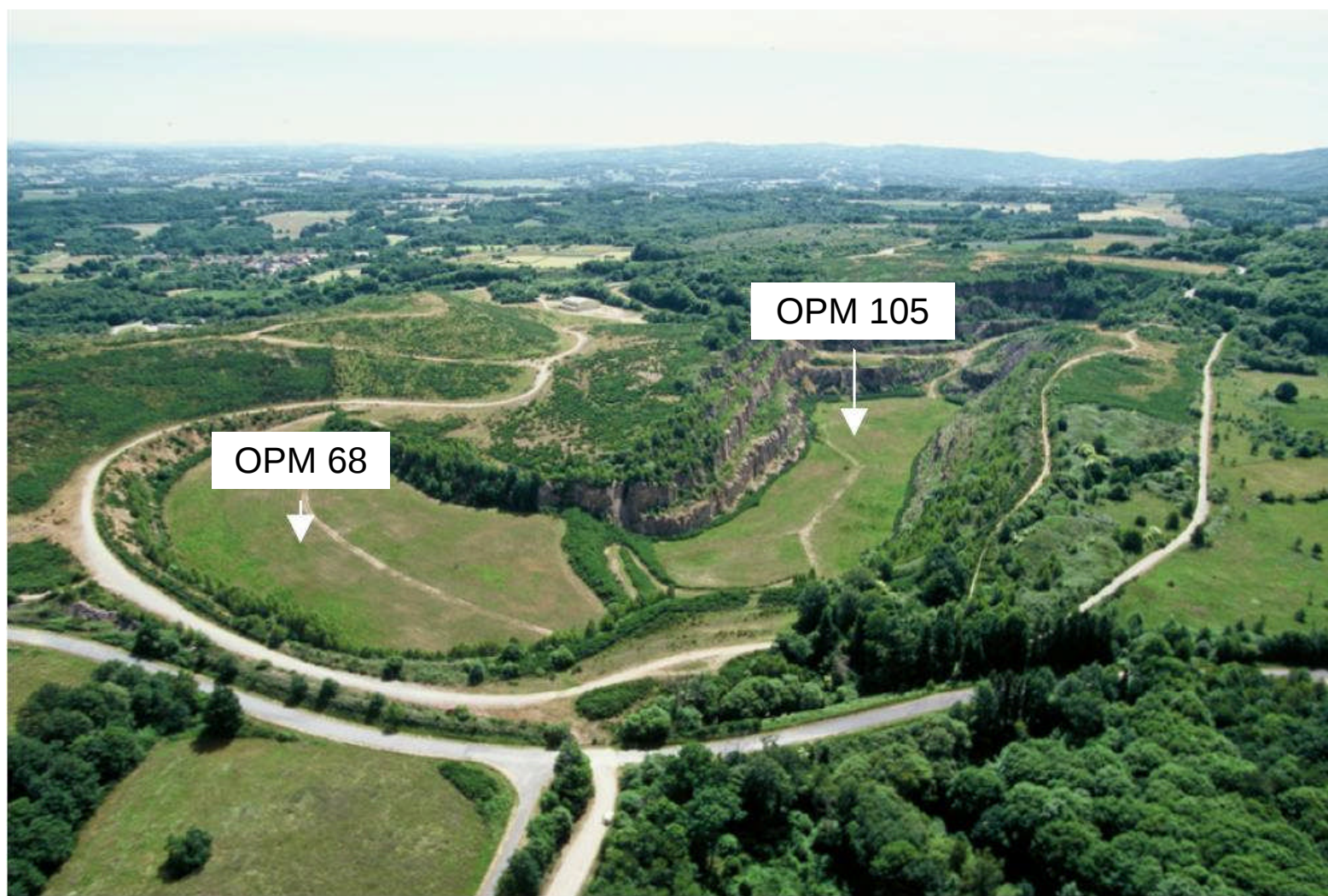
2 open pit mines

A 2 to 12 meters  
waste rock  
overburden

The OPM 105 linked to  
underground mine  
pool



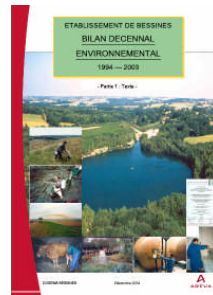
## Site of Bellezane



# The AREVA 10-year environmental report & the related IRSN reviews



## Prefectorial regulation (January 2004)

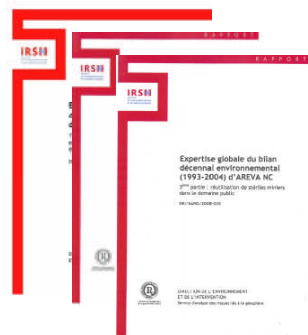


*Issue : December, 2004*

Objectives : the monitoring plan for the follow-up of the overall impact caused by the sites



## Prefectorial regulation (December 2005)



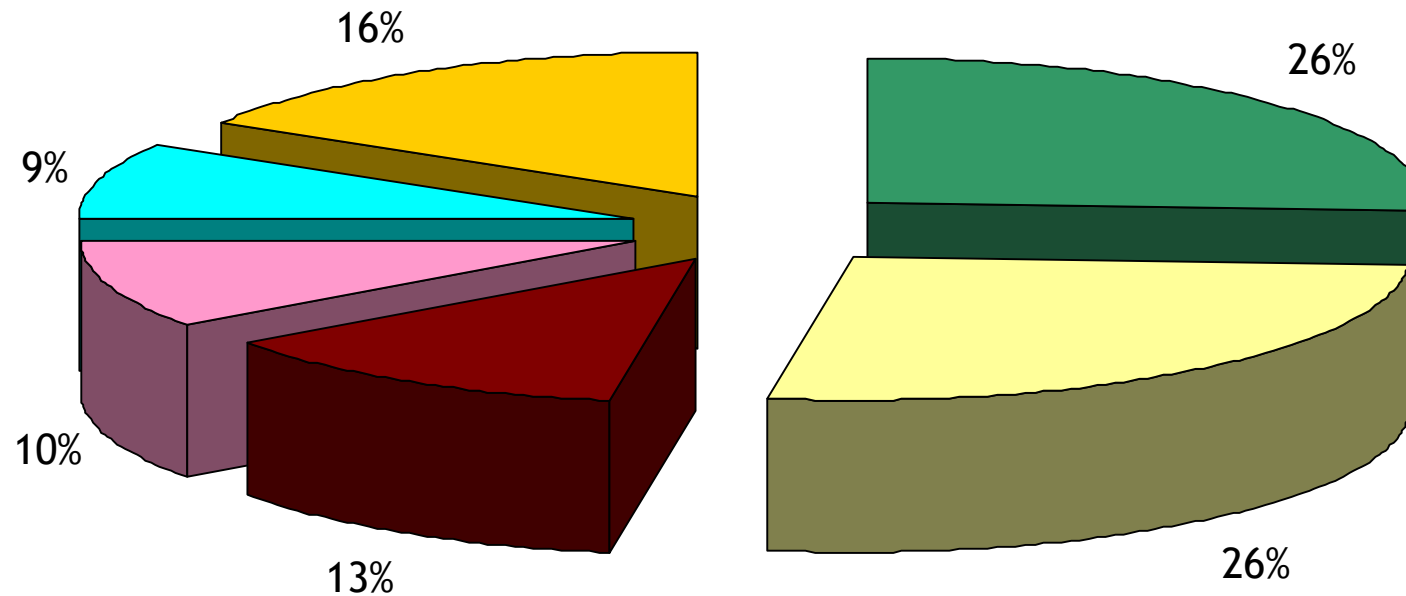
**Review Parts 1, 2 and 3**

*Issues : 2007 and 2008*

Objectives :

- assessing the efficiency of the remediation (natural landscaping, waste rock cover, water treatment plants...)
- assessing the relevance of the surveillance network including the concern for the future of the mining systems
- analysing the methodology of the impact assessment and the way it has been applied by AREVA
- assessing the issues of the former use of waste rock in the public domain

## Current situation of the monitoring : percentage of sites monitored



- Monitoring required by regulation
- Monitoring at the initiative of AREVA
- Monitoring stopped
- No monitoring
- Irrelevant (trenches...)
- No information

# Current situation of the monitoring

## Monitoring implemented by AREVA

- Monitoring required by regulation
- Monitoring at the initiative of AREVA

## Other monitoring activities

- Unannounced controls realized by the local authority (DRIRE)
- Measurements for the environment follow-up (IRSN)
- Specific measurements realized for the follow-up of some remediation works (pond cleaning...)
- Specific measurements realized by NGOs

## Environment follow up : dataset available from the monitoring implemented by AREVA

- **Gamma dose rate**
- **Water (before and during water treatment for the watercourses involved)**
  - Piezometric data (pH, U238 and Ra226 soluble and non soluble concentrations...) ; concentrations in every local watercourse (rivers, creeks...) ; concentrations in the water from wells
- **Sediments**
- **Air**
  - Potential Alpha Energy concentration, radon concentration
- **Food chain**
  - U238, Ra226 and Pb210 concentrations in vegetables (carrots, beets, leeks, apples, turnips, cabbages), milk, fishes, animals (hens and rabbits)
- **Where ?**
  - In many places inside the Crouzille Mine Division
- **When ?**
  - Every week, every month... (depending on the parameter measured), during several consecutives years
  - Different timeframes : periods of measurement do not necessarily coincide from a parameter to another !

**!!! Little data available before remediation !!!**

## Example of data available (not required by regulation)



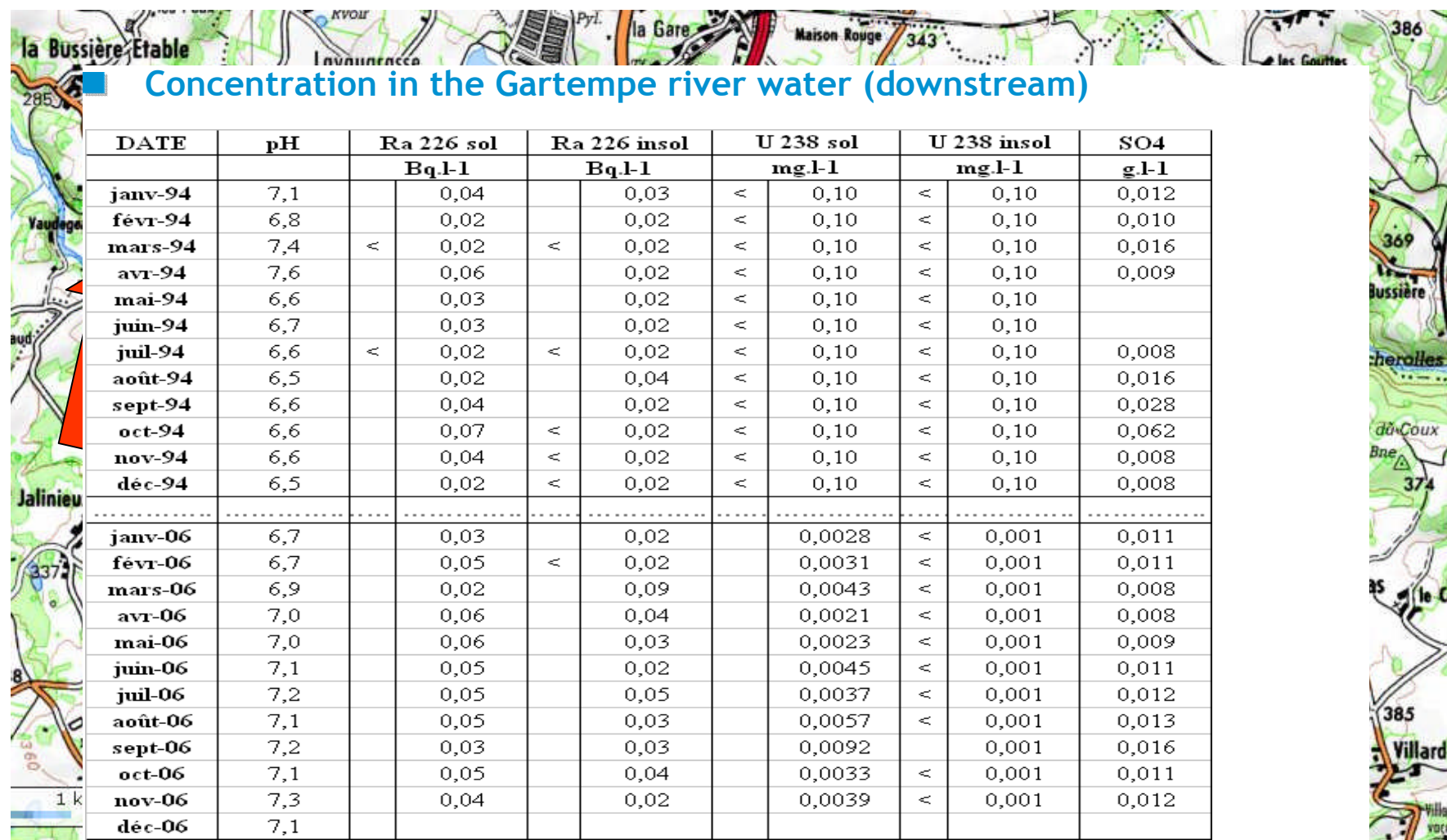
Rabbit in Lavaugrasse Village

| PRELEVEMENT |             |       | INDICATIONS |           |                  |                     | ANALYSES                                          |                |                 |                 |                 |
|-------------|-------------|-------|-------------|-----------|------------------|---------------------|---------------------------------------------------|----------------|-----------------|-----------------|-----------------|
| Date        | Lieu        | Code  | Nature      | Fractions | Masse<br>fraiche | Masse de<br>cendres | Activités massiques calculées dans le poids frais |                |                 |                 |                 |
|             |             |       |             |           | g                | g                   | Ra 226<br>Bq/Kg                                   | U 238<br>Bq/Kg | Pb 210<br>Bq/Kg | Th 230<br>Bq/Kg | Po 210<br>Bq/Kg |
| 15/10/2001  | Lavaugrasse | 9 FAT | lapin       | chair     | 1246,26          | 14,28               | < 0,6                                             | < 1,4          | < 2,3           | < 20,5          |                 |
| 08/10/2003  | Lavaugrasse | 9 FAT | lapin       | chair     | 1458,3           | 16,7                | < 0,2                                             | < 1,0          | < 0,6           | < 4,8           |                 |
| 12/10/2005  | Lavaugrasse | 9 FAT | lapin       | chair     | 1480,9           | 18,4                | < 0,5                                             | < 1,5          | < 2,1           | < 8,1           |                 |



!!!! Pay attention of some results very close to the background level !!!!

## Example of data available (required by regulation)



# Agenda for the meeting in France

## ■ Day 1 (Fontenay-aux-Roses, near Paris)

- Presentations given by IRSN, ASN (Nuclear Safety Authority) and MSNR (Ministry of Environment) relative to the uranium mining past activities, remediation and future, regulation...

## ■ Day 2 and 3 (Bessines-sur-Gartempe, central France)

- Presentations given by AREVA relative to remediation issues, surveillance...
- Site visit : industrial site of Bessines (Lavaugrasse + Brugeaud)
  - Water treatment
  - Passive treatments explored (tree barks...)
- Site visit : Bellezane

**Thank you for your attention**