

*Marie-Odile Gallerand (IRSN)*

# **RE-USE OF URANIUM MINING WASTE ROCK IN THE PUBLIC DOMAIN**

***Main outcomes of the review of the current  
situation in the Limousin Area (FRANCE)***

# CONTENTS

- **Context**

  - Overview of uranium mining in France with focus on the Limousin Area

  - The AREVA 10-year environmental report

  - The IRSN critical review in relation to the work of the GEP

- **Main issues of the reuse of waste rock in public domain**

  - Current uses and consequences

  - Main risks and long term concerns

  - Case studies of existing situations

- **Regulatory framework**

  - The regulations

  - Actions planned by AREVA

- **Conclusion**

# Context

## Overview of uranium mining in France with focus on the Limousin area

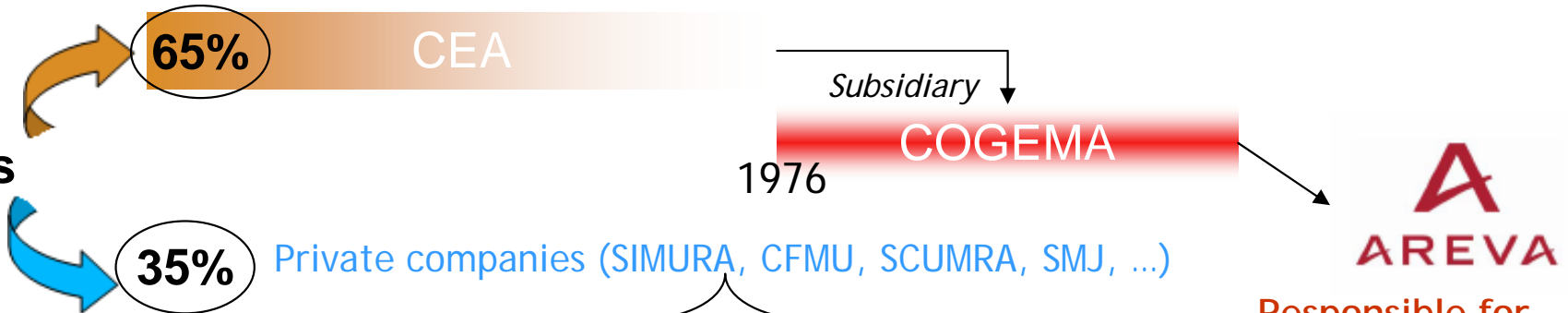
Henriette  
1<sup>st</sup> mine : 1948

Jouac  
Last mine : 2001

2<sup>nd</sup> world war



U reserves



Responsible for remediation works and survey of most of the former French sites

under the supervision of the DRIRE\* and ASN\*\*

\*Local technical support organisation for the Authorities

\*\* Nuclear safety Authority

# Context

## Overview of uranium mining in France with focus on the Limousin area

210 mine sites

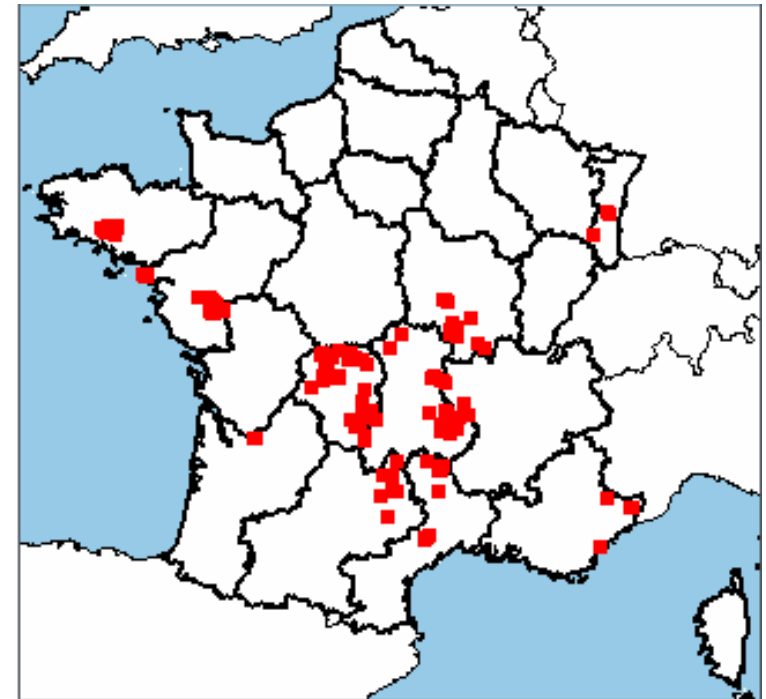
### Working period : 1945 -1995

- 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+



# Context

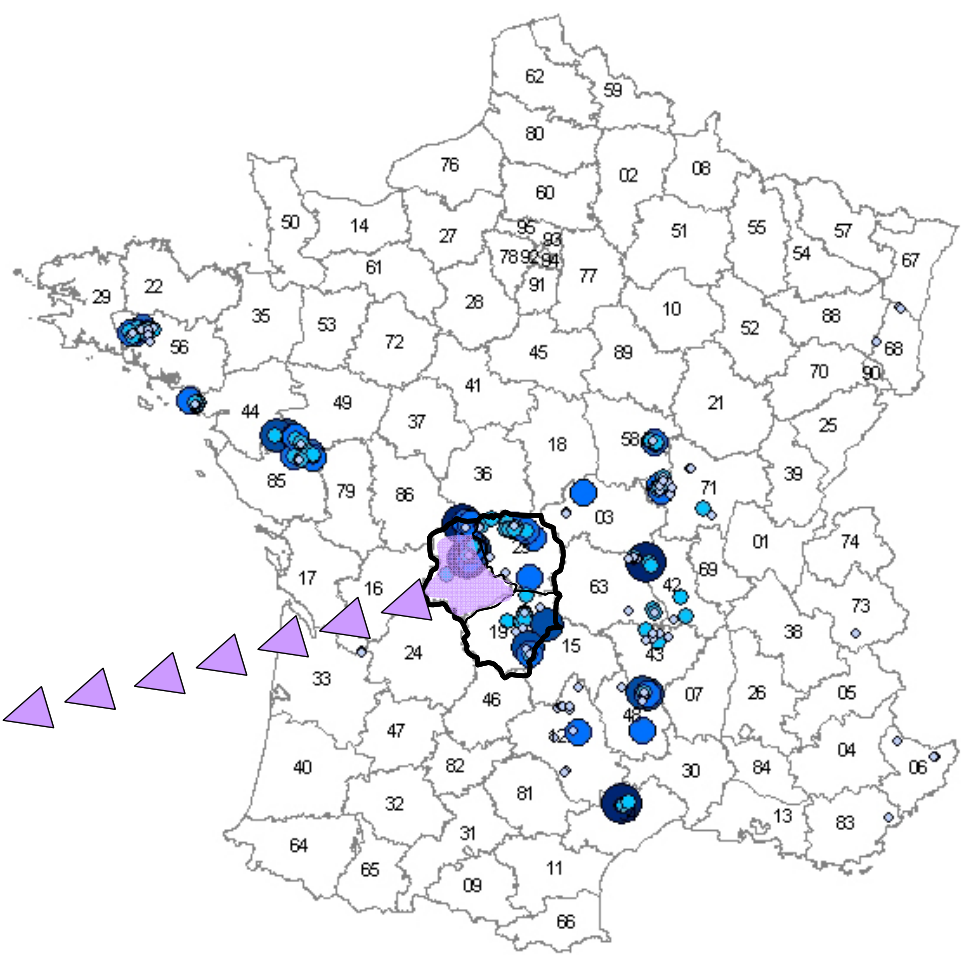
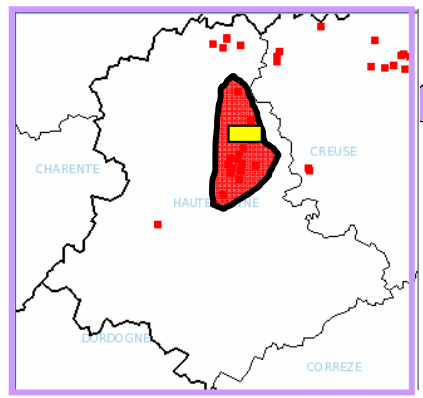
## Overview of uranium mining in France with focus on the Limousin area

40% of the French production

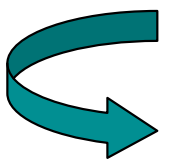
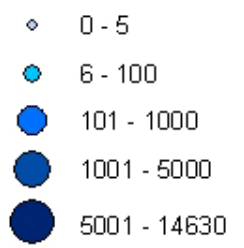
Haute Vienne district

Crouzille Mine Division :

- 24 sites 
- 4 tailings repositories 



Tons of U produced

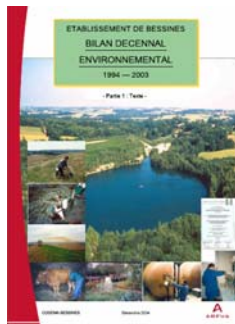


Most of the remediation works finished in 2003

## 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

Issue : November, 2008

Objectives of review 3: assessing the issues of the former use of **waste rock** in the public domain



# Context

## The IRSN appraisal in relation to the work of the GEP



Starting point for interactions with the **expert pluralist group** (GEP) set up in 2005 by the French ministries of health, environment and industry

- <http://www.gep-nucleaire.org>



- Improve **dialogue between stakeholders**
- Generalise the recommendations to **all sites** and considering **long terms** issues
- Provide **methodological tools** for impact assessments



**Final report expected by the end of 2009**

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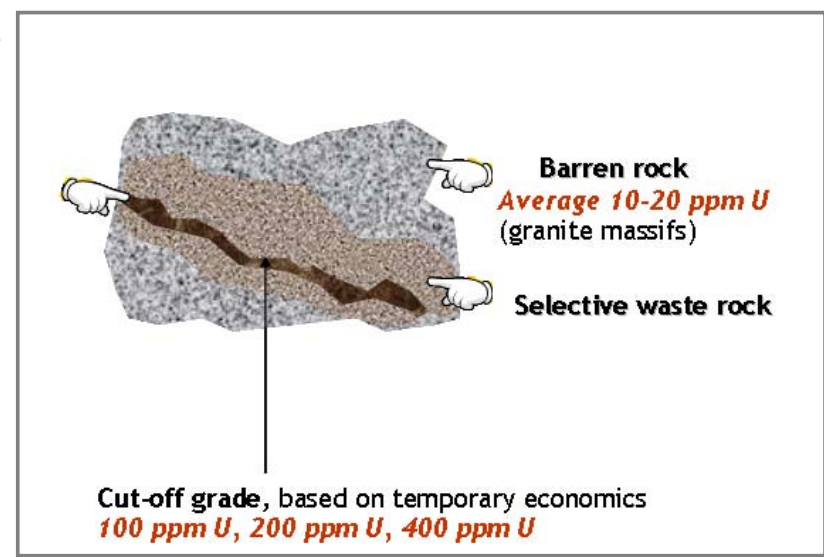
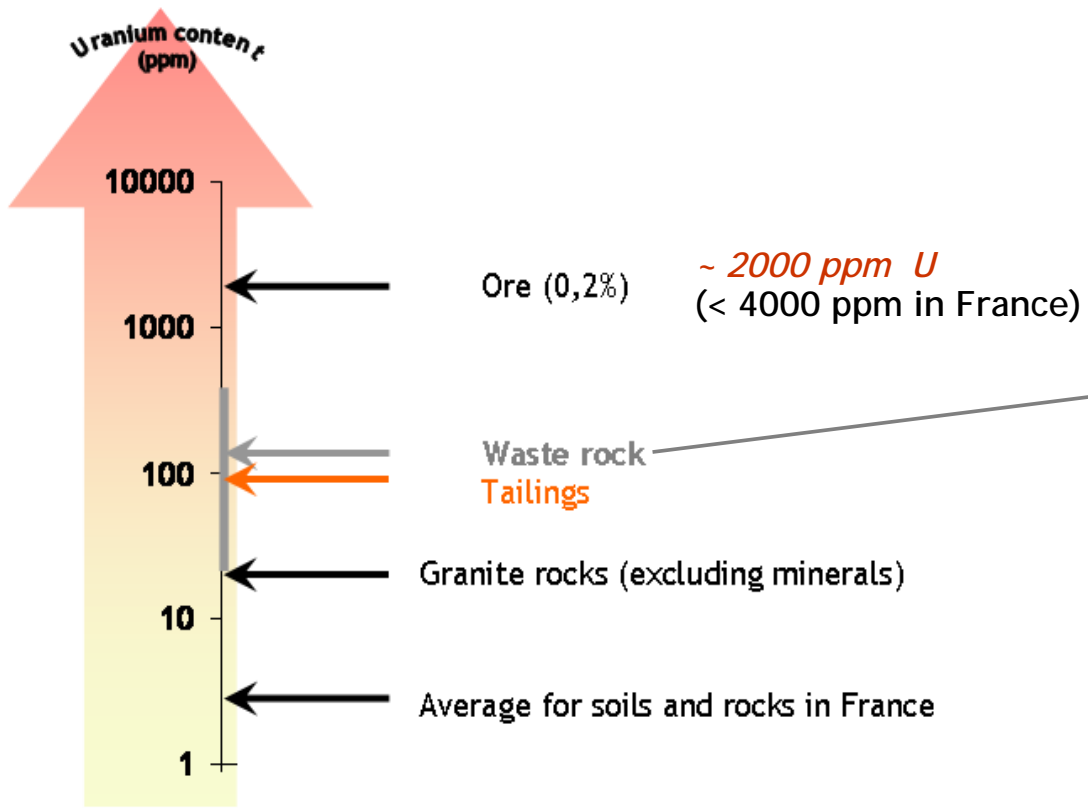
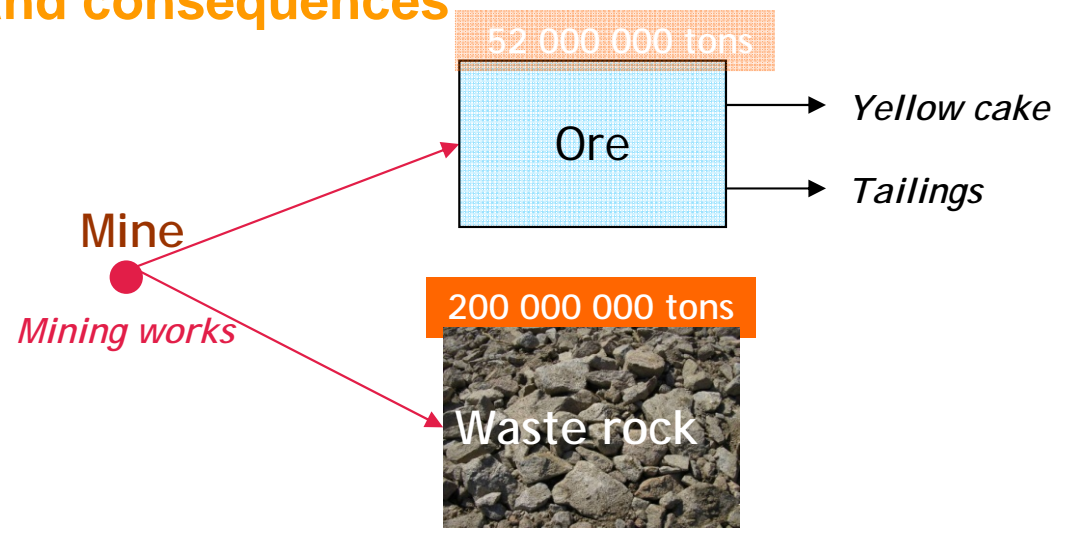
  - Actions planned by AREVA

- **Conclusion**

# Main issues of the reuse of waste rock in the public domain

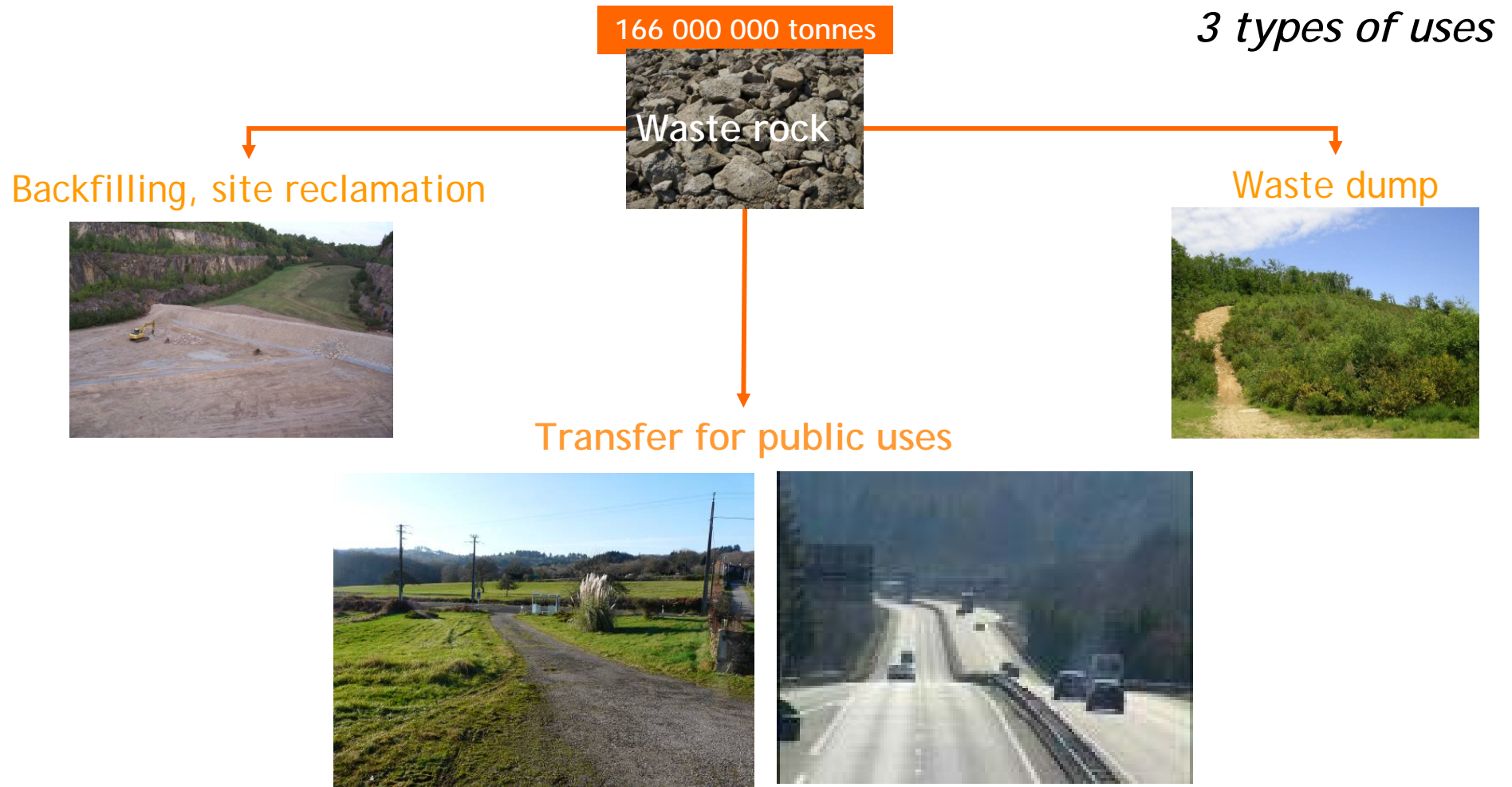
## Current uses and consequences

*Approximate U content of materials and waste in the mining context*



# Main issues of the re-use of waste rock in the public domain

## Current uses and consequences



- **Small quantities** ➤ neighbourly relations
- **Significant quantities** ➤ sales contracts with local quarry and public works companies

# Main issues of the re-use of waste rock in the public domain

## Current uses and consequences

- ❑ Increase of the **gamma exposure** locally

Background level	0,1-0,2	μSv/h
Granite	0,3	μSv/h
Waste rock	0,5-0,8	μSv/h
Tailings	1,5 - 10	μSv/h

- ❑ Materials could be **ingested** in particular situations (ex : playground)



- ❑ **Radon accumulation** when used as foundation materials for dwellings or public places



# Main issues of the re-use of waste rock in the public domain

## Main risks and long term concerns

Weak points

1984

No constraints

Constraints :

- Recording** all relevant data concerning the transfers
- Avoiding** the use of waste rock for any construction and foundation
- Limiting** the U content of the material transferred (< 100 ppm)



No data about

- quantities
- location
- uses

No control of air quality and uses

Possible error during the *in situ* radiological sorting



# Main issues of the re-use of waste rock in the public domain

## Main risks and long term concerns

Occurrence of exposure situations  
not in compliance with the use

- present uses
- long term situations



RISKS of unjustified exposure  
of the population

Improvement of the **risk control** related to the waste rock re-use issues:

- Identification of the current situations by investigation of the area backfilled with waste rock and assessment of the health impact if relevant
- Planning restrictions to limit any modification of the area backfilled with waste rock

# Main issues of the re-use of waste rock in the public domain

## 2 Case studies of existing situations

Former U mine site  
("Bigay Gourniaud")



School in Lachaux

Sawmill « Mondière »

Former U mine site  
("Bois Noirs Limouzat")

© IGN

# Main issues of the re-use of waste rock in the public domain

## Case studies of existing situations

Sawmill « Mondière »

### 1998. Assessment of the radiological situation around the “Bois-Noirs Limouzat” site

- Significant levels of radioactivity in the backfill materials used for the foundations
- Radon activity in air # **10 000 Bq.m<sup>-3</sup>** measured in non ventilated rooms

**In 2003, AREVA removed about 8 000 m<sup>3</sup> of backfill materials on site since 1960**

### scientific and technical follow-up committee



**Request for the inventory of the sites and constructions concerned by the re-use of waste rock, based on information given by the population and the local communities**

# Main issues of the re-use of waste rock in the public domain

## Case studies of existing situations

Sawmill « Mondière »

QUESTIONNAIRE forwarded by AREVA in January 2004 to the neighboring population

Results presented by AREVA to the Local Information Committee made up of

- Local elected members
- Representatives of local associations for the protection of the environment
- Representatives of the operator (AREVA)
- Technical experts (if required)



4400 questionnaires sent out

55 completed questionnaires returned

83 sites potentially concerned by waste rock re-use

- *Dwellings*
- *Schools*
- *Facilities (sport, culture)*
- *Industrial platforms*
- *Farmyards, roads, pathways*

# Main issues of the re-use of waste rock in the public domain

## Case studies of existing situations

### School in Lachaux

In 1980, the Puy de Dôme Environment Association was informed of the backfilling of the Lachaux school playground with materials from the former uranium mine of “Bigay Gourniaud”, under exploitation from 1950 to 1955.

- Confirmation through radiological controls
- No significant radon activity measured inside the school
- The total annual exposure estimated less than 1 mSv
- Schools deserve particular care. Exposure to waste rock gamma emission is unjustified



In compliance with the precautionary principle, the decision was made by AREVA and the public authority to remove the backfill materials



Removal by AREVA in 2006



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## The regulations

**Euratom Directive 96/29** dated May 13, 1996, specifies the basic standards for the health protection of the population and workers against the hazards from ionising radiation arising from nuclear activity



any activity likely to lead to the exposure of people to ionising radiation from either an artificial source or a natural source if this source has been processed for its radioactive or fissile properties (Health Code)

Dose limit for the public from nuclear activities = 1 mSv/y

**The practice of re-use of waste rock is not included in the scope of nuclear activity such as described in the health code**



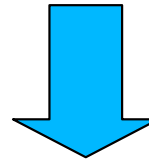
- **The regulation does not strictly apply to such situations**
- **1 mSv/y is used as a default reference value**

## The regulations

Circular dated July 22, 2009, signed jointly by ASN and the Ministry of the Environment, relative to the management of the former uranium mines



for the attention of the local Authority



**PLAN of ACTIONS**  
to



**PURSUE the MANAGEMENT**  
of the **FORMER U MINES**

1. Control the former sites

2. Investigate further into the environmental and health impacts and improve the monitoring of the sites

3. Manage the waste rock transferred to the public domain : destination and impact assessment if necessary

4. Increase information and dialogue



### Objectives

#### Inventory of the areas concerned by the re-use of waste rock (U > 300 ppm)

2009 : **qualification of the methodology** of the inventory by radiological air detection based on an investigation of 1000 km<sup>2</sup> in the Limousin Area



2010 : **application of the methodology** to 2000 additional km<sup>2</sup>, provided the relevance of the methodology

#### Follow-up :

- **In situ control of the exposure levels**
- **Assessment of the compatibility between exposure levels and uses**
- **Management of the inconsistent situations, in agreement with the authorities**

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# Conclusion 1/3

- The transfer of waste rock in the public domain = common practices
  - < 1984 with no constraints
  - > 1984 in compliance with a specific procedure (records and constraints)
  
- The main risks associated with this practice:

## For the present-time

- < 1984 : uses inconsistent with the exposure levels and in particular with indoor radon concentration (*ex building foundation*)
- > 1984 uses non compliant with the uses declared by the beneficiary
  - Changes of uses (*ex resale of the land*)
  - U content of the waste rocks > 100 ppm (*ex error during the radiological sorting*)

## For the long term period

- Changes of the use (*site location omission*)

## Conclusion 2/3

- **No regulation regarding the dose limit for the situations of re-use of waste rock in the public domain**
  - by default, reference to **1 mSv/y**
- **Lack of data concerning the radiological impact for existing situations**
  - Existing situations need to be inventoried and assessed if relevant
  - Impact assessment recently carried out by AREVA on the basis of various exposure scenarios (*assessment subject to IRSN expertise, at the request of ASN*). Cases may exist where the exposure levels exceed 1 mSv/y.
- **Long term issues**
  - Focus on the risk of changes in the use of the land backfilled with waste rock
    - Remove the materials where the total annual dose calculated for all scenarios, exceed the reference value
    - Ensure the traceability of the area backfilled with waste rock and implement planning restrictions

### A new joint document from ASN and the Ministry of Environment defining an action plan to pursue the management of the former uranium mine site, including the issues of waste rock re-use in the public domain

- AREVA has presented an action plan for the inventory of the areas concerned with waste rock. It started in October 2009 initiating the qualification of the **investigation methodology based on radiological air detection**
- Requirements to ensure that AREVA's proposals and results will **enable to single out the situation hazards** (in particular, situations where waste rock is used as foundation materials)
- Processing of the results of AREVA's investigations into the **MIMAUSA database** (*updated information concerning the administrative situation of the French uranium mine sites and the monitoring arrangements*)



[WWW.irsn.org / mines d'uranium /](http://WWW.irsn.org/mines_d'uranium/)

**Thank you for your attention**