Possible scenarios for the Bellezane modelling

EMRAS II WG 2, Vienna, 24-28 January 2011

FANC AFCN

Overview of site

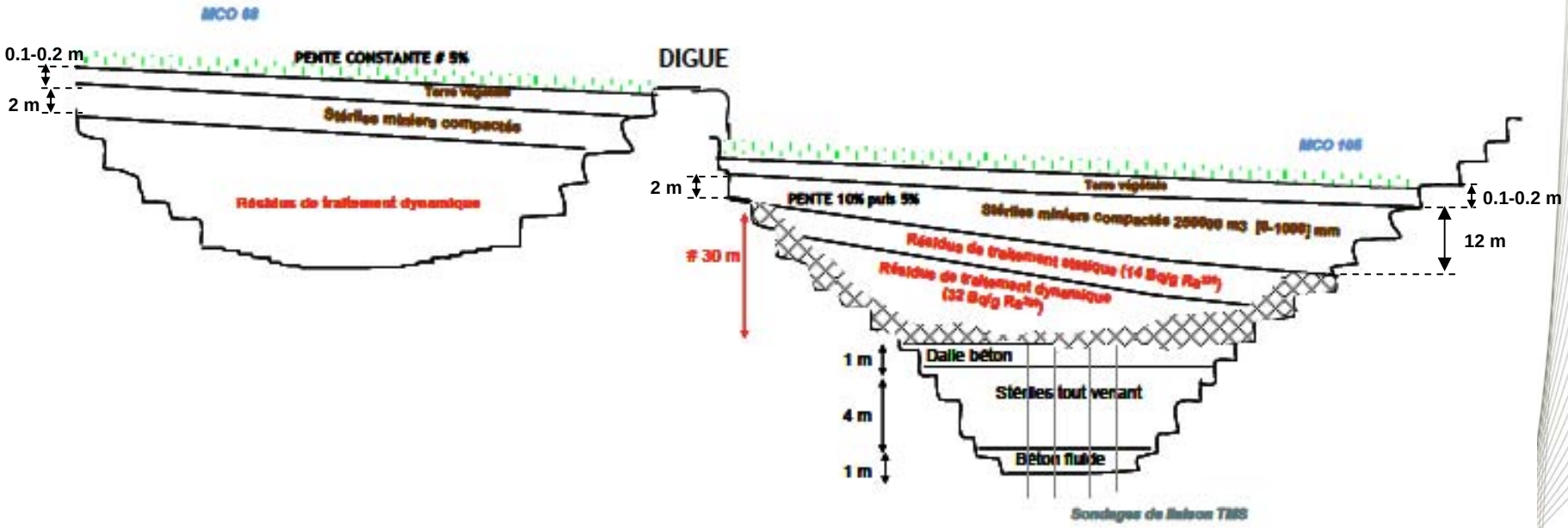
Uranium mining (underground + open pit) between 1975 and 1992
⇒ two millions tons of rock extracted
⇒ open pit mines (MCO 68 + MCO 105) filled with U tailings between 1988 and 1992
⇒ end of mining works in 1992
⇒ coverage of U tailings with waste rocks and a vegetal layer in 1995-1996

Source term

Total area (MCO 68 + 105) ~12 ha

Successive layers: vegetal cover, waste rock, tailings

+ (only MCO 105) concrete basement between additional tailings layer. No grouting or additional liners to prevent groundwater percolation.



Source term (2)

a) **MCO 98**

- Compacted waste rock: **0.5 Bq/g** U-238 + daughters

Permeability: K = 2.8 10^{-7} m/s

- Tailings: **1.6 Bq/g** U-238 + **32 Bq/g** Ra-226

b) **MCO 105**

- Compacted waste rock: **0.6** Bq/g U-238 + daughters
- First layer tailings: **5** Bq/g U-238 + **14** Bq/g Ra-226
- Second layer tailings: **1.6** Bq/g U-238 + **32** Bq/g Ra-226

Transfer data: hydrogeology

- Catchment area of site: ~ 120ha
- Granitic soil
- Average piezometric level: +360m

Water flow

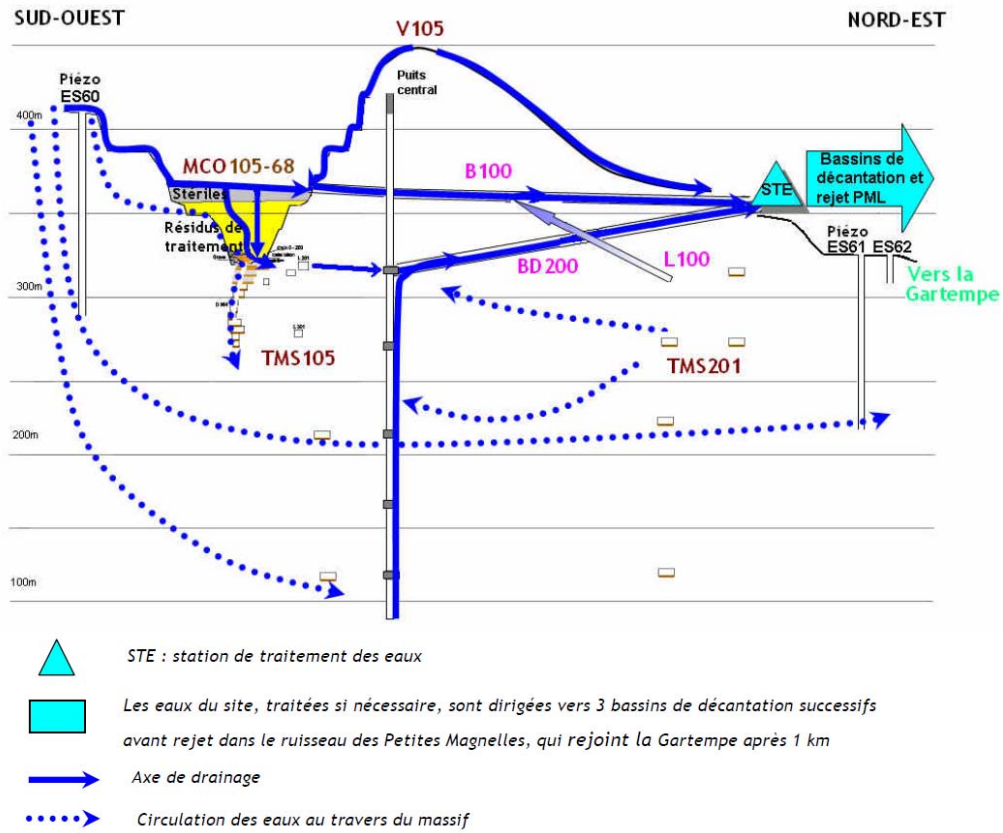
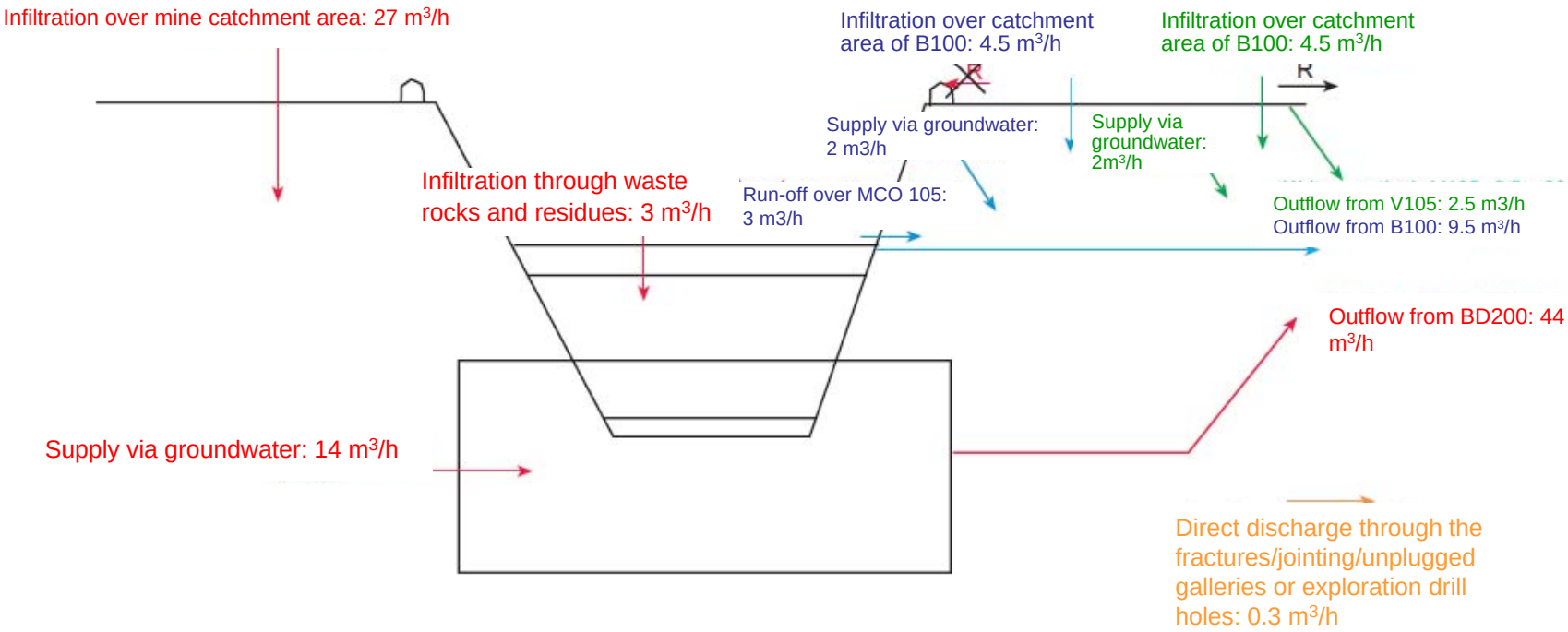


Figure 3-5 : Coupe schématique NE-SO du site de Bellezane - Principaux axes de drainage et de circulation des eaux

Transfer data: hydrogeology

Water balance



Transfer data

- Site-specific data about climate
- No site-specific data over K_d
- No site-specific data over transfer-factors to animals and plants
- Monitoring data: see Thierry's presentation

Exposure scenarios

1. Current impact

Representative person: inhabitant of village

Exposure scenarios

Radiological impact on an **adult living and working in the village**

- Walking on site **half-an-hour / day**

- **Quarter** of diet: locally grown products (irrigated in summer with well-water)

- Meat (*rabbits, poultry, beef, sheep + deer, boar*) all fed from local contaminated pasture/grain, well water. Fish from local contaminated streams

$\Rightarrow$ Total dose ? Most important exposure pathways ?

$\Rightarrow$ Radionuclides concentration in groundwater, streams, meadows ?

Exposure scenarios

2. Intrusion scenario

Dwelling on site

Family lives and works on site, grows some vegetables in their own garden (quarter of diet)

⇒ Total dose ? Most important exposure pathways ?

⇒ Radionuclides concentration in home-grown vegetables ?

⇒ Local meat and fish exposed to radionuclides from pasture, well water, streams?