RADON IN SOIL GAS VERSUS RADON FLOW IN CHARACTERIZATION OF URANIUM TAILING SITES

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PROBLEMS:

• U-tailings:
  • How to locate borders of tailings body with high activity residues of U production?
  • How good is tailings isolated (covered)?
  • If U-tailings is a source of radon?

• Building sites:
  • How high is radon level in soil gas?
  • How intensive is radon flow from surface of soil?
  • What is a source generating radon flow?
Equipment application concept

- Separate sampling and measurement taking into account weather conditions,
- Simple in use sampling approaches,
- Equipment:
  - Universal,
  - High sensitivity,
  - High throughput,
- High developed technology (because of wide range of application) – LSC.
Radon in soil gas measurement
Radon in air measurement system based on charcoal and LSC

Application:
1 – Teflon vial, 20 ml; 2 – vial cap; 3 – capsule with activated charcoal; 4 – container for activated charcoal, 5 – Metal spring-holder, 6 – tabulated activated charcoal, 7 – cap for capsule, 8 – metal mesh.

Integral measurements of radon:
1 – in air (1-2 days); 2 – in soil gas (1 day); 3 – exhalation (radon flow from soil surface (1 day)).
Location of U-tailings on territory of Dniprodzherzhynsk town

10 tailings and storages,
Mass - 40 million tons,
Total activity - 3200 TBq,
Square - 270 hectare.
http://baryer.dp.ua/
Estimation of radon in soil gas measurement on territory of U-tailings
Classification of sampling sites radon in soil gas and radon flow

Radon-222 in soil gas, kBq m\(^{-3}\)

Radon flow from soil surface, mBq m\(^{-2}\) s\(^{-1}\)

- **Low radon in soil**
- **High radon in soil**
- **Extra high radon in soil**

- **High radon flow**
- **Medium radon flow**
- **Low radon flow**
ALL SITES COULD BE CLASSIFIED AS:

- Natural soil (NS) with low radon in soil gas and low radon permeability,

- NS with low radon in soil gas, average and high radon permeability,

- Tailings with average radon in soil gas with average and high radon permeability,

- Tailings with high radon in soil gas with high radon permeability (UP) and other with thoroughly coating with low radon permeability (DOWN).
Building site case:
1. Air sampling system.
2. Portable LS Counter.
3. Building site view.
4. Sampling.
5. Radon in soil gas distribution.


The end
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