# A SAFETY MOMENT

## Radon: An Unseen Hazard

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# RADON

- Radon gas is a radioactive, colorless, and tasteless byproduct of uranium-238 decay.
- The half-life of radon is 3.8 days, which would seem to be a problem that would solve itself, but the continuous decay of Uranium in mines produce a steady flow of this toxic gas.
- If stringent measures are not taken to mitigate radon concentrations in the air, miners may be at risk to health problems such as lung cancer.
- In the U.S. alone, 21,000 deaths per year are the result of radon induced lung cancer. It is the second leading cause for lung cancer with first place belonging to cigarette smoking.

# RISKS: IN SITU LEACHING

- The dominant uranium mining technique is in situ leaching.
- This method of extraction minimizes the increase in radon gases and ore particulates at facilities.
- The same regulations apply for in situ leaching as for open pit and underground mining.
- This requires monitoring of air, dust, and gamma radiation.

In situ leaching still has its risks, especially around evaporation ponds.

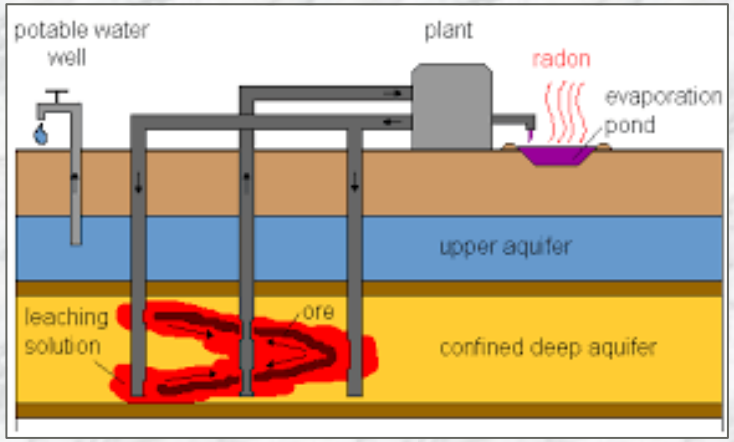


Image from Stanford.edu

# RISKS: OPEN-PIT MINING

- Open-pit mining is still conducted at some sites in the U.S.
- This type of extraction process is conducted in the open air and thus has natural ventilation.
- Despite this natural ventilation system radon gas increases during the removal of overburden and waste rock.
- This mining technique can stir up dust and expose miners increased levels of radon gas.
- Waste product is sprayed with water to prevent the circulation of dust in the air.

Image from Carnemolla, 2015

# RISKS: UNDERGROUND MINING

- Underground Mining is conducted at only one facility in Utah.
- This mining technique is the most susceptible to air quality problems, because of the its confined nature.
- Ventilation systems are installed and must run the entire time to ensure air quality meets regulatory standards.
- Ventilation systems for this type of mining can be very expensive, so many underground mines have ceased production due to economic downfalls and health risks.

Image from Kuiper, 2009

# TAKING PRECAUTIONS

- Since 1967, safety measures have been created that limit workplace exposure to 170 hours per month (WLM, working level month, 0.083 WL).
- Working levels of $1/12^{th}$ WLM require no breathing apparatus for workers.
- At concentrations above 166 WL, a self-contained breathing apparatus is required to enter that area.
- Radon sampling is required four times annually for all work areas.
- Smokers are strongly discouraged to work in mines with levels of radon due to the cumulative health effects of radon and cigarette smoke.