

Uranium Mining Industry Views on ICRP Statement on Radon

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Introduction

- WNA working group
- Industry views on radon
 - Recent epidemiological results
 - Dosimetric approach
- Path forward

WNA Radiation Protection Working Group

- World Nuclear Association
 - Comprises full nuclear fuel cycle
 - Nearly 200 companies
 - 90% world uranium mining production
- WNA Uranium Mining Standardization and Radiation Protection Working Groups
- Specific task group focussed on radon issues
 - Major and junior uranium companies
 - Companies operate in Africa, Australia, Canada, Kazakhstan, Mongolia, United States

Evolution in Radon Risk

- ICRP 2009 statement
 - Dose conversion factor (DCF) based on epidemiological approach likely to increase
 - Shift from epidemiological approach to a dosimetric approach for DCF

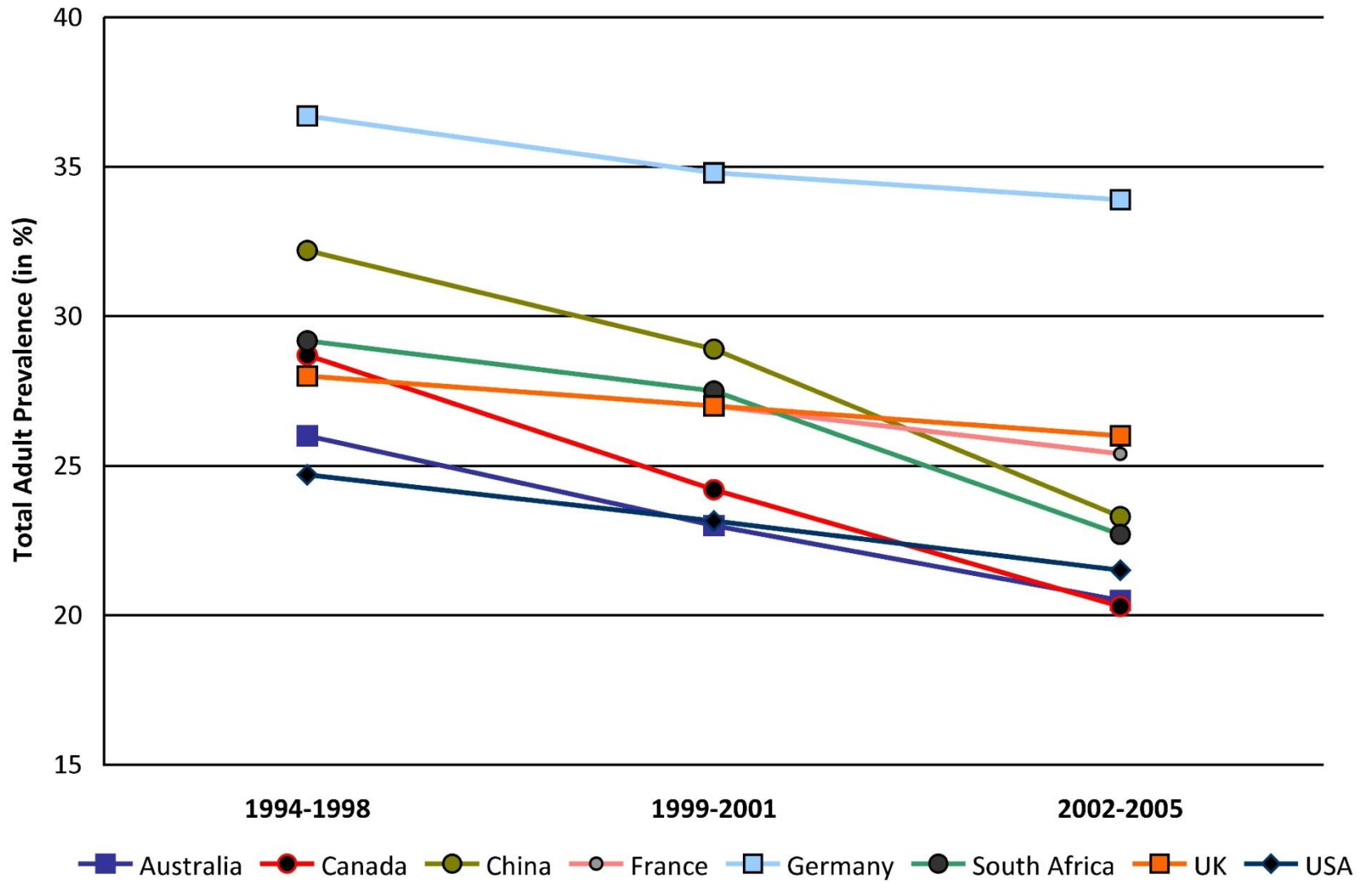
Epidemiological Results

- ICRP has indicated it believes the latest epidemiological results support an approximate doubling of radon risk
- Industry supports using latest epidemiological results, but notes several issues that need to be addressed transparently

Epidemiological Results

- Risk projection models are relative risk models and underlying population characteristics important
- Smoking is the dominant risk for lung cancer
 - Recent ICRP report notes risk is on the order of 20 times greater for smokers vs non-smokers
- General trend of declining smoking rates, which implies subsequent decrease in lung cancer rate

Smoking Prevalence for Selected Countries



Epidemiological Results

- Sensitivity of dose conversion factor (mSv per WLM) to smoking rates done by SENES using different published risk models
- Median result 6 to 7 mSv/WLM for nominal 30% smoking rate (current value 5 mSv/WLM)
- Given decreasing smoking rates expect to see decreasing population average lung cancer risk from radon

Epidemiological Results

- Current DCF of 5 mSv/WLM very protective of non-smokers
- Doubling current DCF of 5 mSv/WLM seems very conservative
- Exposures are optimized at uranium mines and will remain so if DCF changes
- Significant reduction in radon progeny exposure has been achieved through optimization

Dosimetric Approach

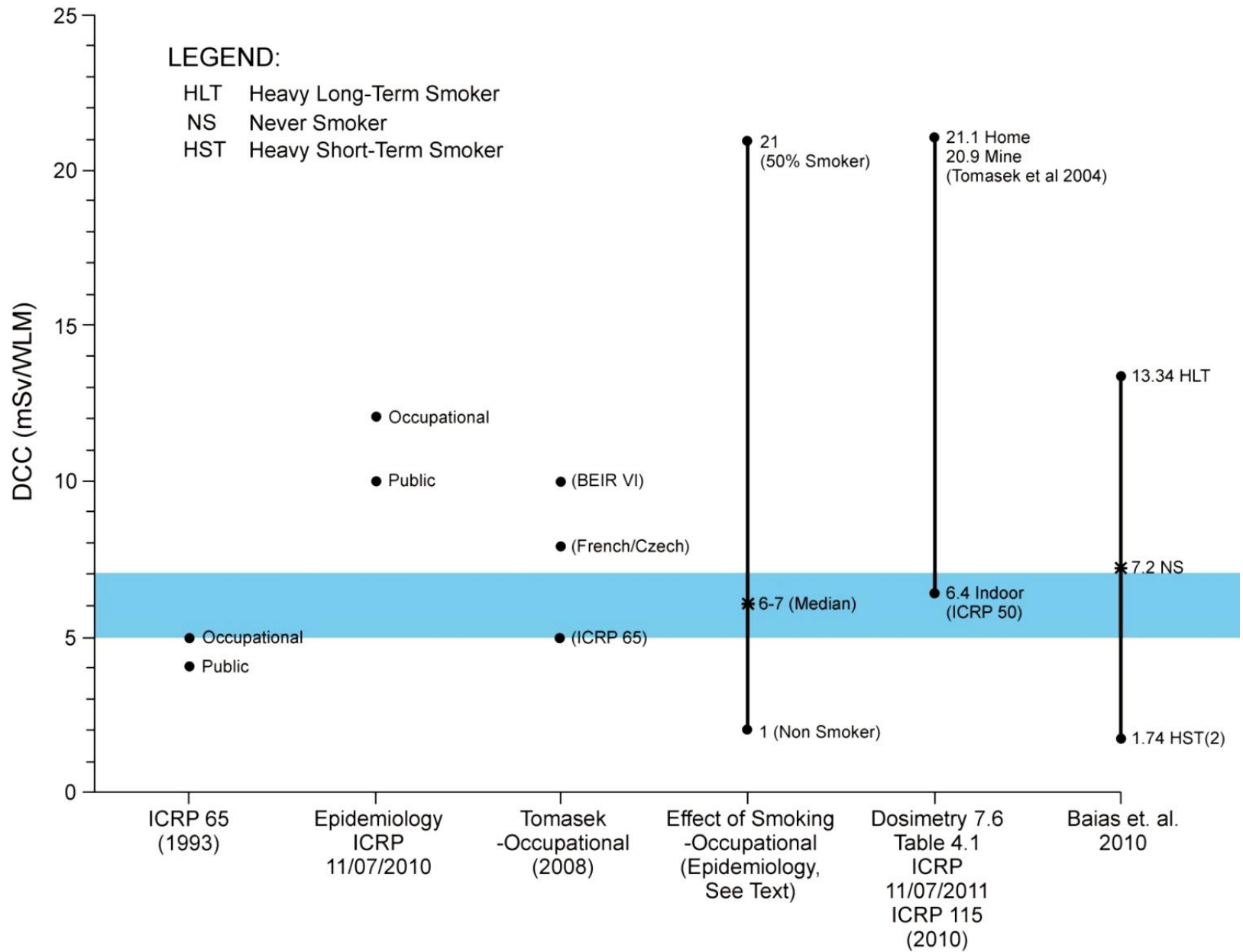
- Industry views adopting the dosimetric approach as premature at this time
 - Validation needed for the dosimetric model
 - Unclear that model adequately accounts for smoking
 - Lack of field data and no widely accepted measurement protocols
- Industry views this as a long-term goal

Dosimetric Approach

- Validation needed for the dosimetric model
 - Is the apparent agreement between the average DCF from the epidemiological studies and “typical” dosimetric parameters coincidence?
 - Can the dosimetric model explain some of the variations in the DCF between different miner cohorts?
 - Examine aerosol parameters for some epidemiological studies and determine if calculated risks are compatible

Dosimetric Approach

- Dosimetric model and smoking
 - Since smoking is the dominant risk dosimetric needs to account for smoking
 - Note recent paper by Baias et al (2010) only shows a factor of two between non-smoker and smoker using dosimetric model
 - ICRP notes a difference on the order of 20 in the risk factor between non-smokers and smokers



Dosimetric Approach

- Lack of relevant field data and measurement protocol
 - Little work characterising Rn progeny aerosols in over last two decades
 - Many changes to uranium industry and mining over last 20 years (reduced exposures to other substances)
 - Little ability to collect needed data in short term
 - No standard measurement protocol

Dosimetric Approach

- More work is needed to:
 - validate the model
 - improve knowledge of Rn progeny aerosol conditions in current workplaces
- Industry strongly recommends deferring the adoption of the dosimetric approach until needed work completed

Path Forward

- Industry organized through WNA to measure radon progeny aerosol conditions
- Working on developing standard measurement protocol (consulting with SENES)
- Goal is to have publishable quality results within several years