

## Radon measurements in conventional Finnish workplaces during measurement seasons 2005-2007

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### In Finland the action level for the radon in inhaled air is 400 Bq/m<sup>3</sup>

- In workplaces where people are working regularly (1600 hours per year).
- The radon concentration stands for the annual mean of the radon concentration during working time.
- The mean radon concentration may be higher than 400 Bq/m<sup>3</sup>, if the work is not regular.
- The action level shall also be applied to public buildings

### Radon measurements

- The responsible party (employers) should measure the radon concentration in a conventional workplaces, but there is no determination of punishment in Radiation Act.
- In aboveground workplace if the workplace is situated in a region where over 10 per cent of the annual mean values of the earlier radon concentration measurements in a work or residential environment exceed 400 Bq/m<sup>3</sup>
- In all underground rooms
- In all workplaces situated on eskers or other gravel or sand formations which are readily permeable to air.
- STUK issues annually a separate list of municipality where radon measurements shall be made in workplaces and 2007 there was 88 municipalities on the list.

### Radon measurements, classified by type of order

Type of order	Number of orders	Number of radon measurements	Average Bq/m <sup>3</sup>	Maximum Bq/m <sup>3</sup>
State	18	148	360	11 000
Municipality	70	435	200	6 300
Private company	320	1047	320	13 300

408 orders, 1630 measurements, average 290 Bq/m<sup>3</sup>, median 94 Bq/m<sup>3</sup>

In 260 measuring places the radon concentration was more than 400 Bq/m<sup>3</sup>, and in 94 places more than 1000 Bq/m<sup>3</sup>.

### Radon measurements in public buildings

Measuring place	Number of radon measurements	Average Bq/m <sup>3</sup>	Maximum Bq/m <sup>3</sup>	% >400 Bq/m <sup>3</sup>
School	228	400	13 300	20
Day-care centre	69	210	1 830	13
Day club for children	12	270	1 120	17
Public room	131	220	5 800	12

### Radon measurements, classified by type of measuring place

Measuring place	Number of radon measurements	Average Bq/m <sup>3</sup>	Maximum Bq/m <sup>3</sup>	% >400 Bq/m <sup>3</sup>
Service or instrument room	132	710	11 160	37
Industrial premises	148	220	6 120	10
Office	518	220	5 240	12
Underground tunnel	124	660	11 000	32
Storage room	114	310	2 450	22
Others	570	260	13 300	14

### Short time radon measurements

- Short time radon measurements have been made with Alpha Guard or, in some cases, with Pylon AB-5 measuring equipments. The measuring time is at least one week and the measuring period is one hour.
- STUK verified the radon concentrations during working time for 25 employers during the measurement seasons 2005-2007. Twenty six measuring places was the biggest amount for one employer, and this target consisted of two large buildings.

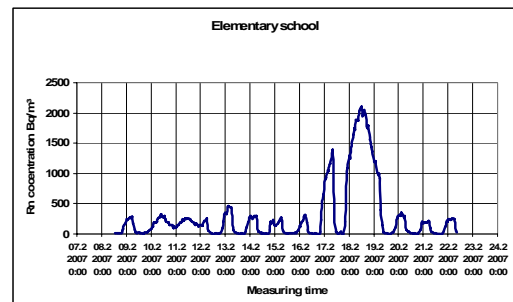
### Conventional workplaces

- In fourteen cases employers had made radon measurements with alpha track method and received results that exceeded the action level 400 Bq/m<sup>3</sup>.
- In nine places the existing ventilation took care of radon gas.
- In three places they sealed up chinks between the wall and the floor and adjusted timing of ventilation before measuring.

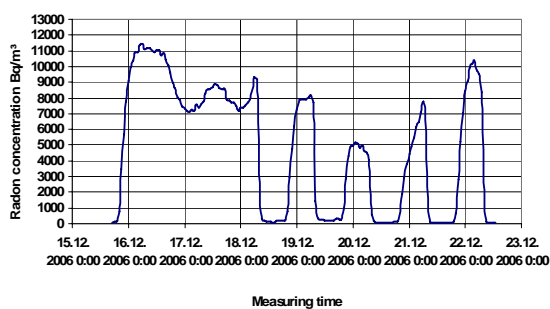
### Other short time measurements

- Short time radon measurements were done also in two underground cavities and five tunnels. There were regular working places in underground cavities, but in these cases the radon concentration was low. In tunnels the fitting of new equipments or renovations were started.
- Radon measurements were made at four buildings because the owners were planning renovations, and they wanted to take radon into account beforehand.

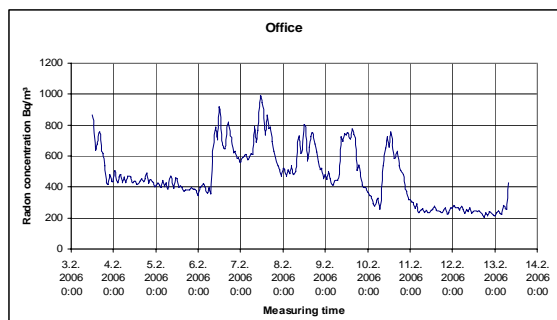
### Elementary school in gravel pit

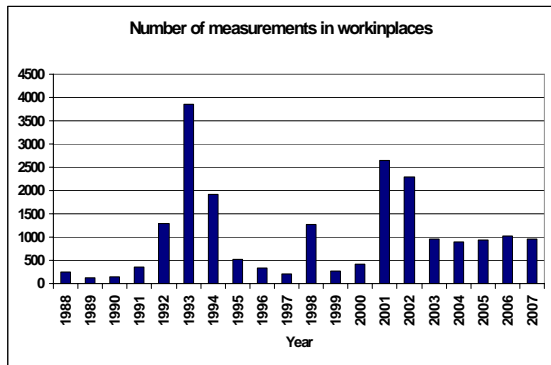


### University, seminar room



### Exhaust ventilation in office





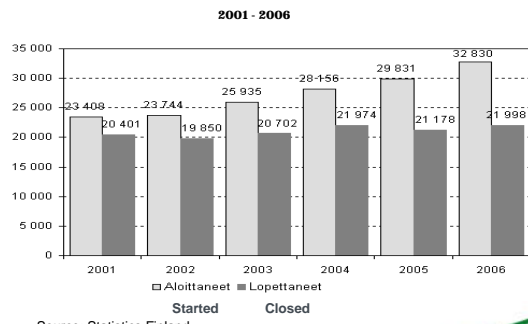
## Number of measurements

- We have done 20657 measurements in workplaces between 1988 -2007
- There were 641 orders and 2915 measurements between 2005-2007, about 4,5 measurements per order

## What to do, if we want to increase amount of radon measurements some day

- Employers self control doesn't work very well
- Determination of punishment in Radiation Act and/or
- Authorities gives measuring orders and/or
- Campaign

## Number of started and closed companies



## AND

- Companies comes and goes
- Owners changes
- House managers changes
- Radonproben is connected to place and building
- We need a good database from buildings
- If we know the address, we know the place