

**EMRAS – Theme 2**  
**Remediation of Sites with Radioactive Residues**

**Urban Remediation**  
**Working Group**

**5-9 November 2007**

**Vienna**

# Goal of the Working Group

**To provide an opportunity to compare and test modeling approaches and models that describe the behaviour of radionuclides in an urban setting**

- **Prediction of changes in radionuclide concentrations and dose rates over time**
- **Prediction of the reduction in radionuclide concentrations and dose rates expected to result from specific countermeasures or remediation efforts**

# Progress of Working Group

- **8th WG Meeting in April 2007**
- **Summary of existing models and modeling approaches**
- **Modeling exercises for selected situations**
  - **Widespread contamination (Chernobyl)**
  - **Localized contamination (RDD event)**
- **Preliminary conclusions**
- **Draft Working Group report**

# **Summary of existing models and modeling approaches**

- **Literature survey of models and modeling approaches**
- **Sources of information on countermeasures**
- **Considerations for selection of appropriate parameter values**

# **Modeling exercises for selected situations**

- **With and without application of countermeasures**
- **Designed to permit comparison of model predictions**
  - **With other model predictions**
  - **With measurements when available**

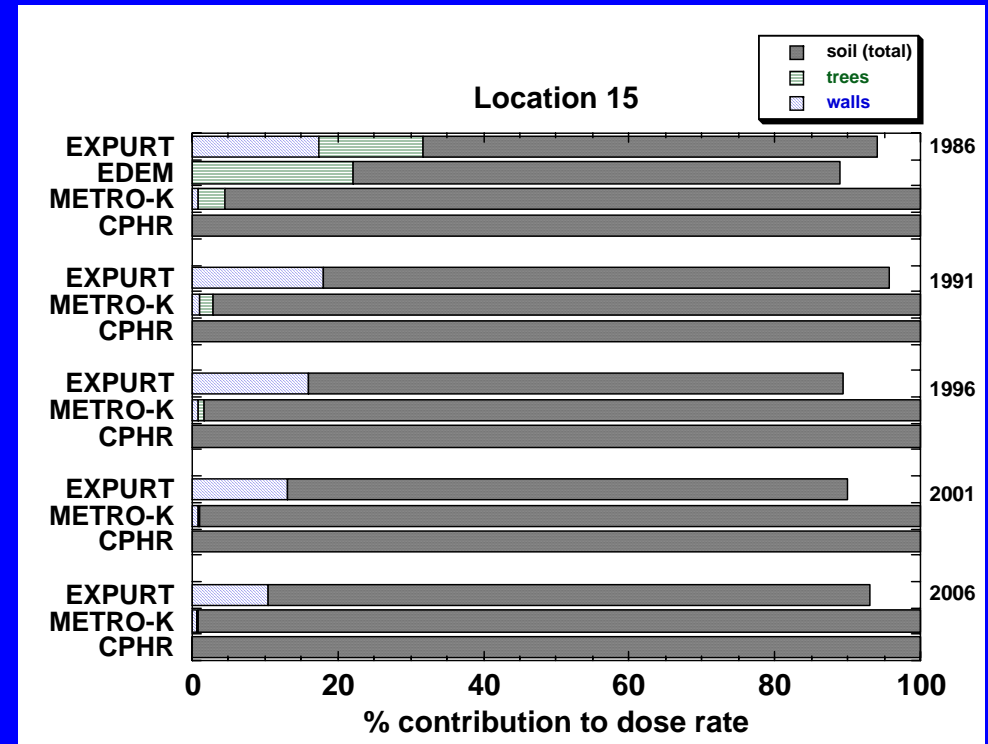
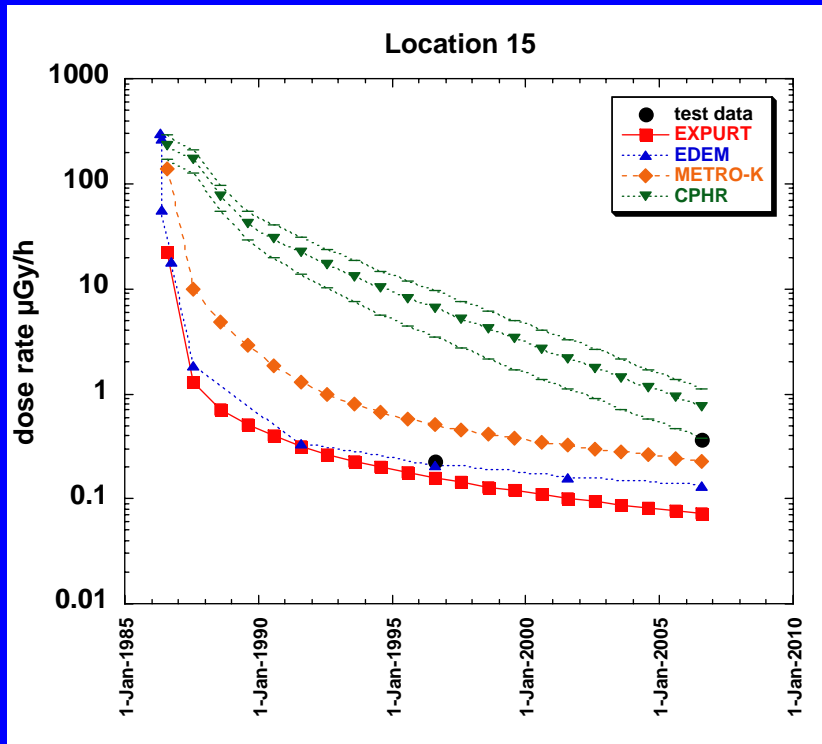
# **First modeling exercise: Pripyat scenario**

- **Chernobyl fallout**
  - Town was evacuated, remained largely uninhabited
- **Time series of dose rates and contaminant concentrations**
- **Indoor and outdoor locations**
- **With and without countermeasures**
- **Some measurements available**

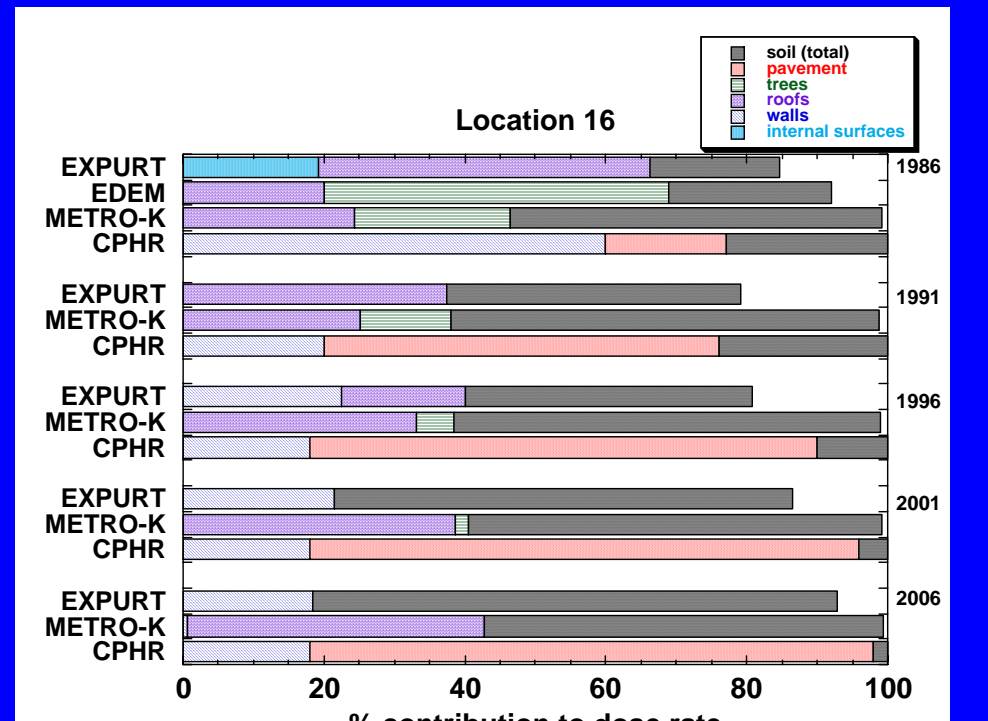
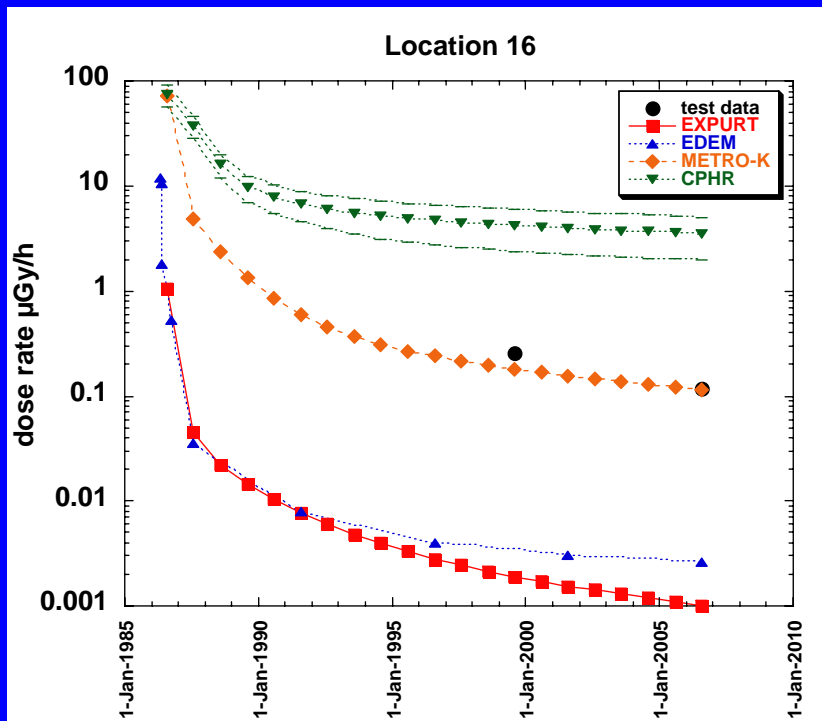
# Dose rate

# % contribution to dose rate

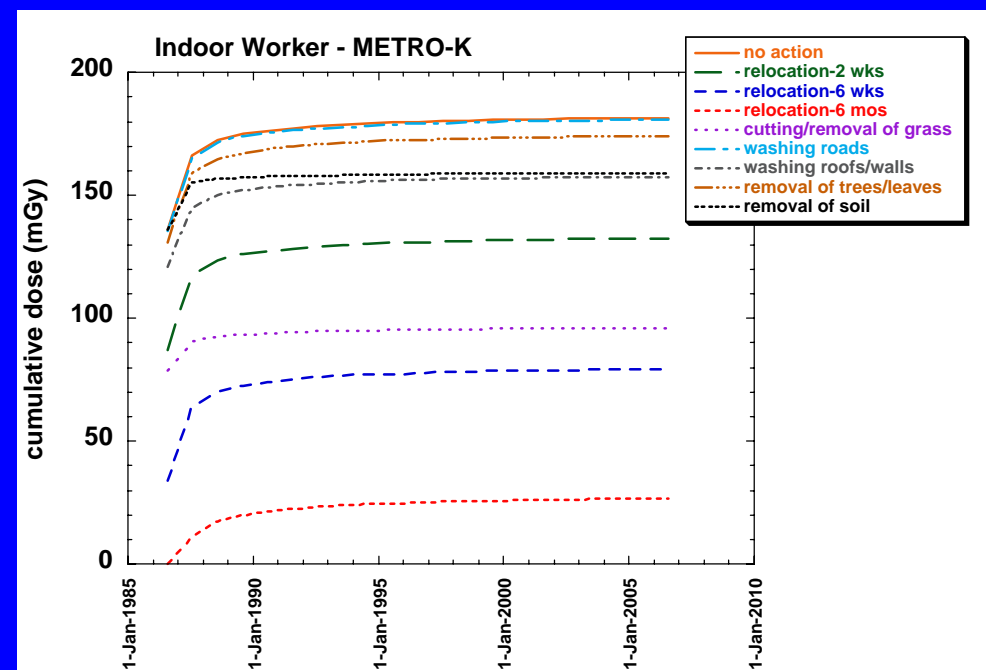
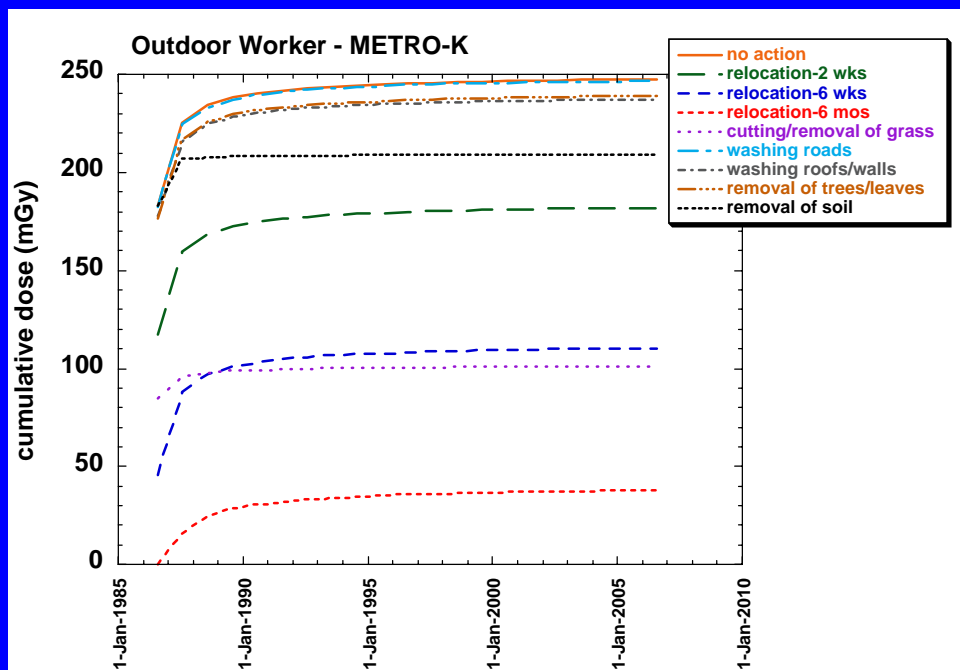
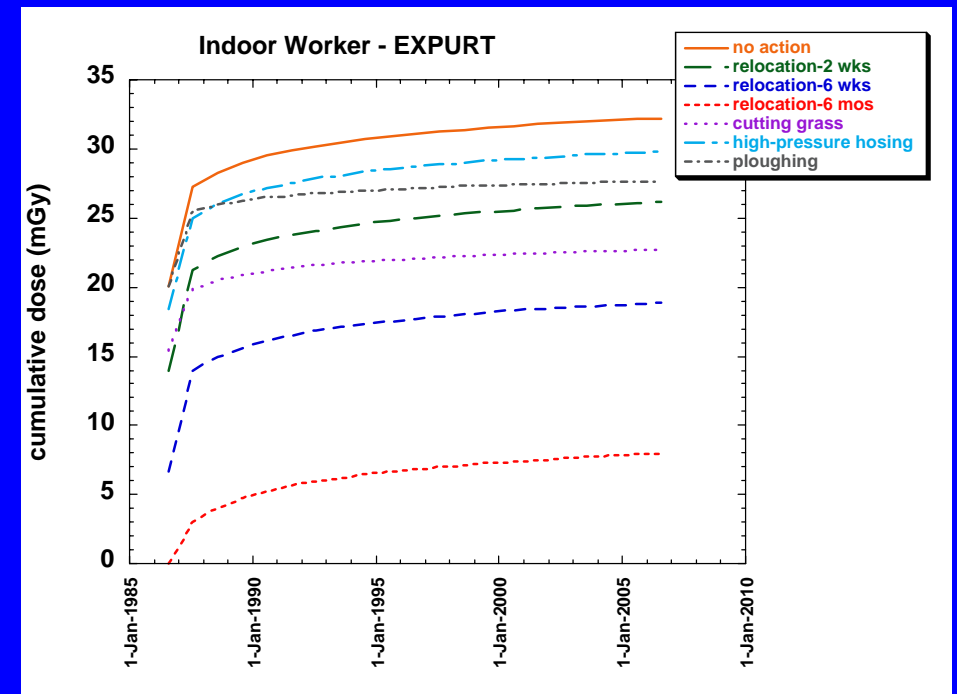
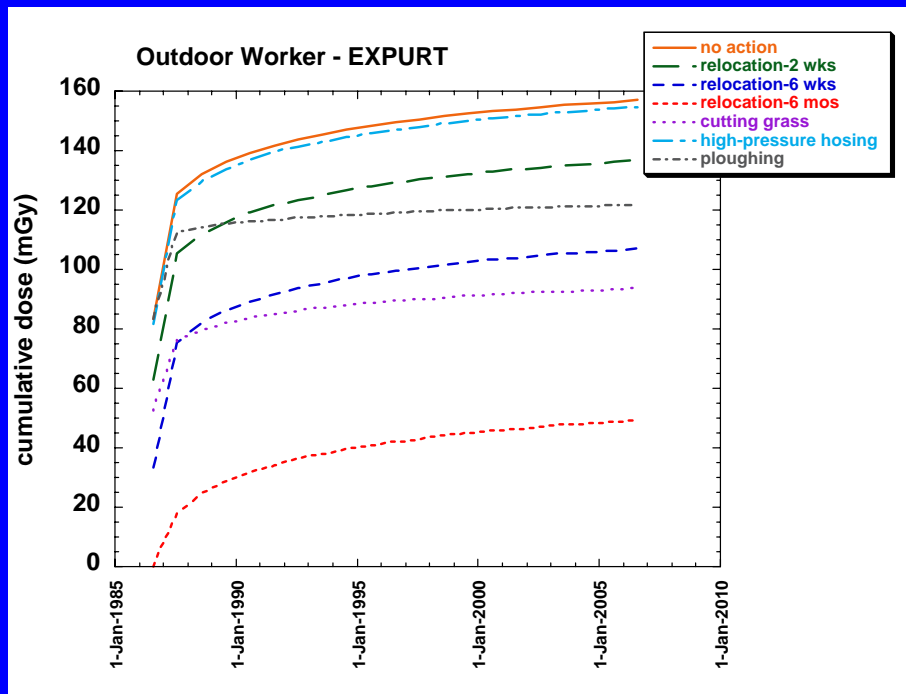
Outdoor



Indoor



# Predicted cumulative doses, with effects of countermeasures

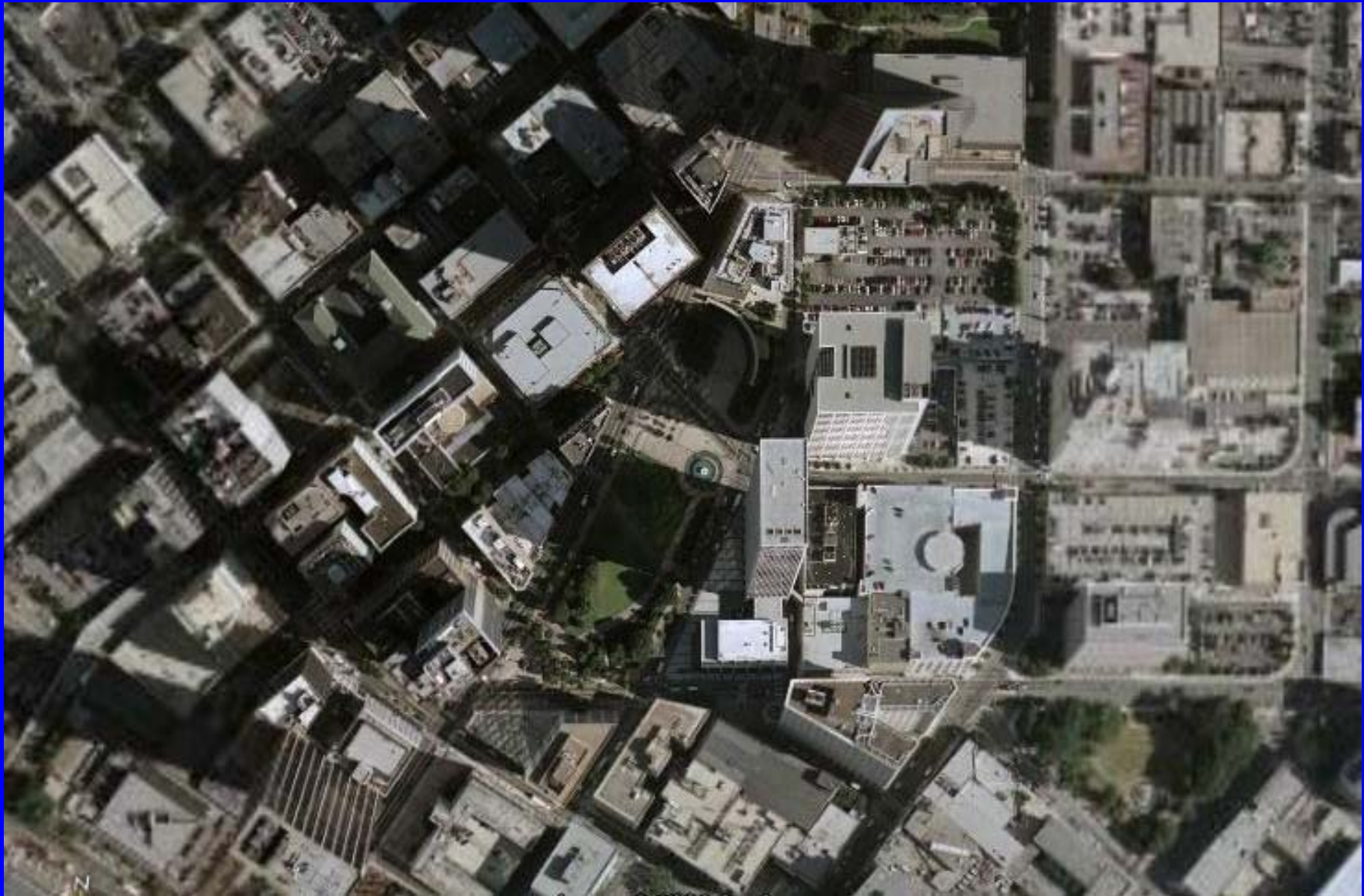




## **Second modeling exercise: Radiological dispersal device (RDD)**

- **Hypothetical release of radioactive material**
  - 5 kg conventional explosion, ground level
  - 50 TBq of Cs-137 in powder form
  - 1 July of Year 0
  - Dry weather, wind 5 m/s from the west
- **Simulated explosion event (Hotspot)**
- **Further simulation (IAMM) to obtain values for reference surface contamination at selected sites**
- **With and without countermeasures**

# Site of hypothetical event



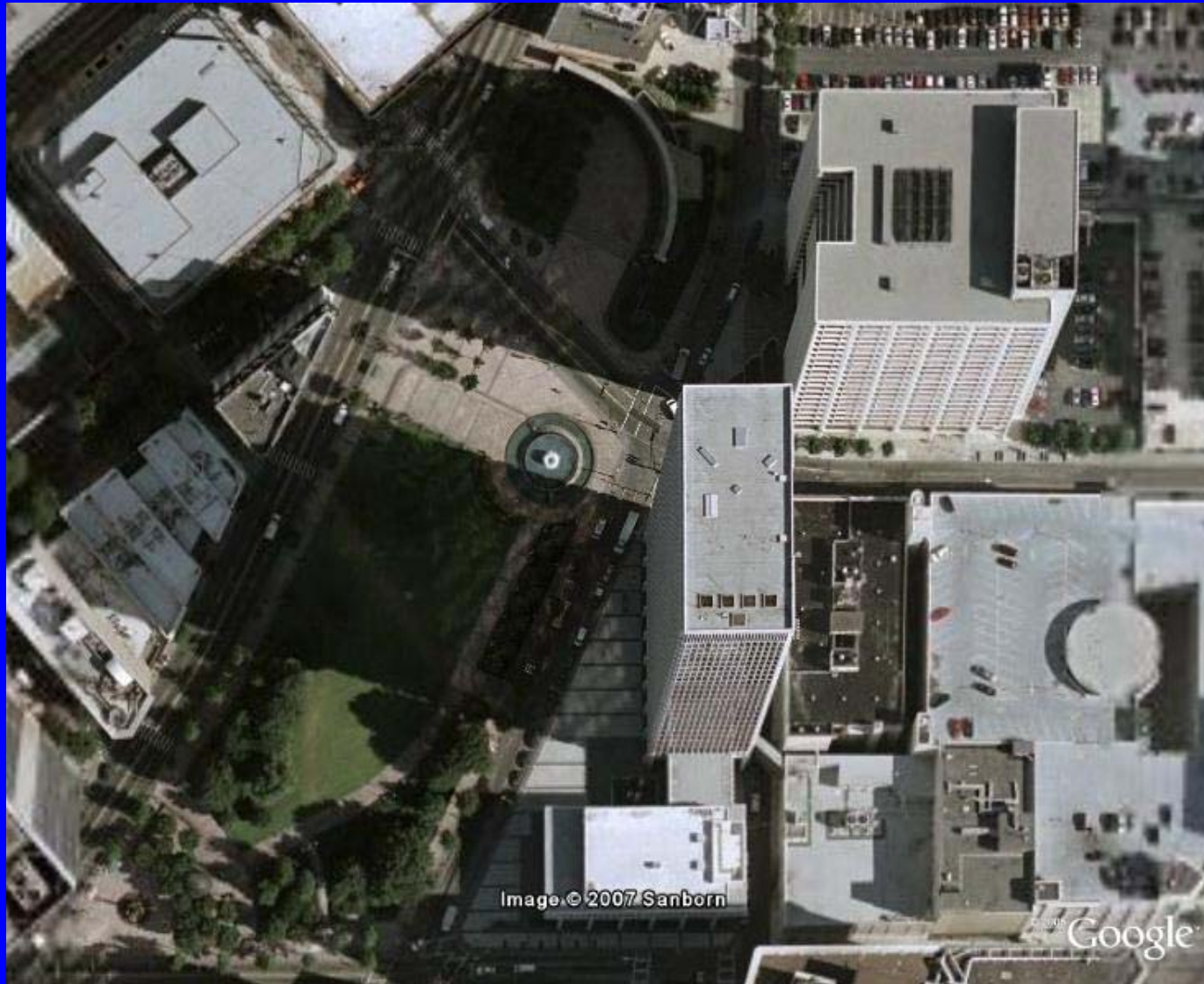


# Contours of reference surface contamination (simulated)



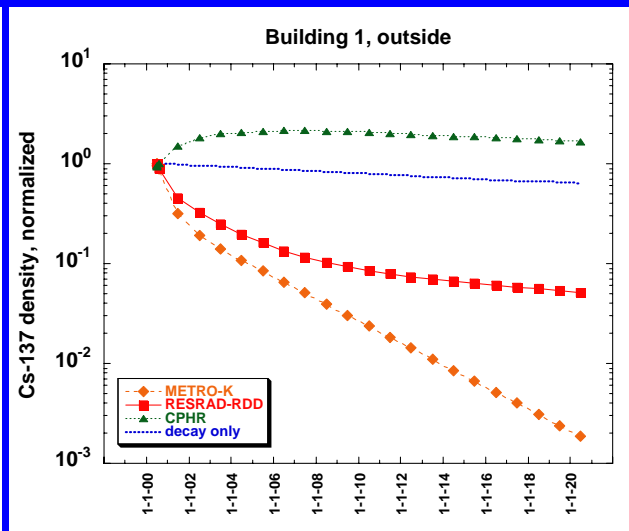
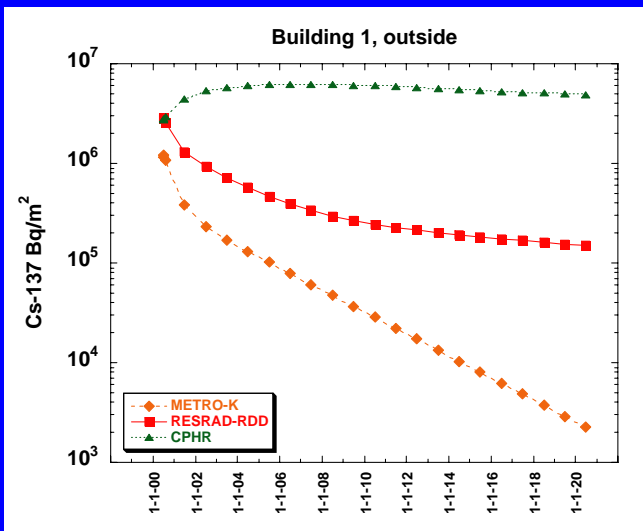
1, 2, 3, and 4 MBq/m<sup>2</sup>

# RDD location and nearby buildings

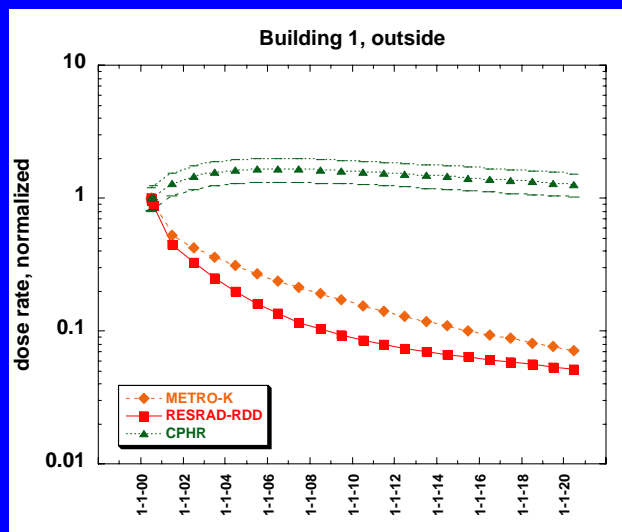
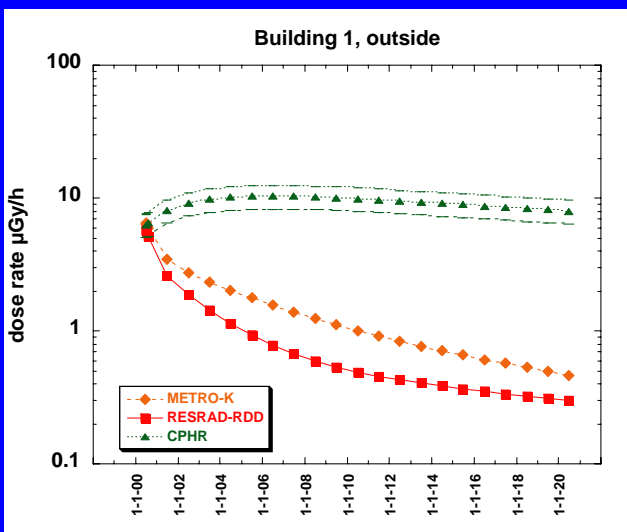


# Building 1, outside

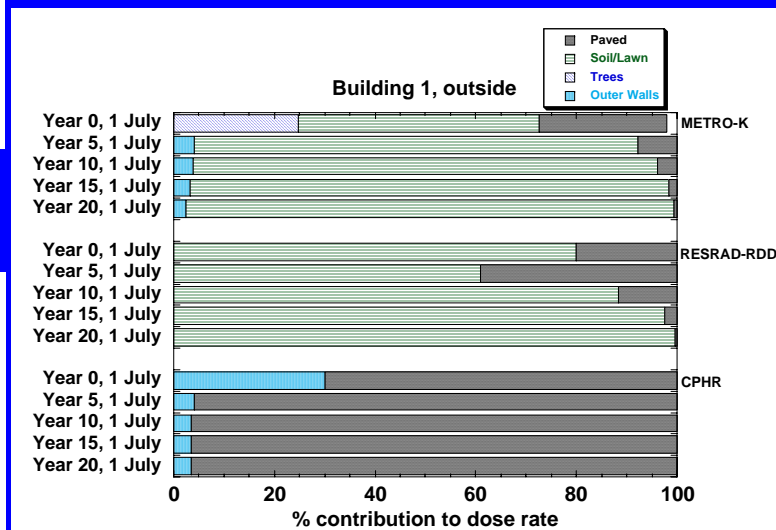
## Contamination density



## Dose rate



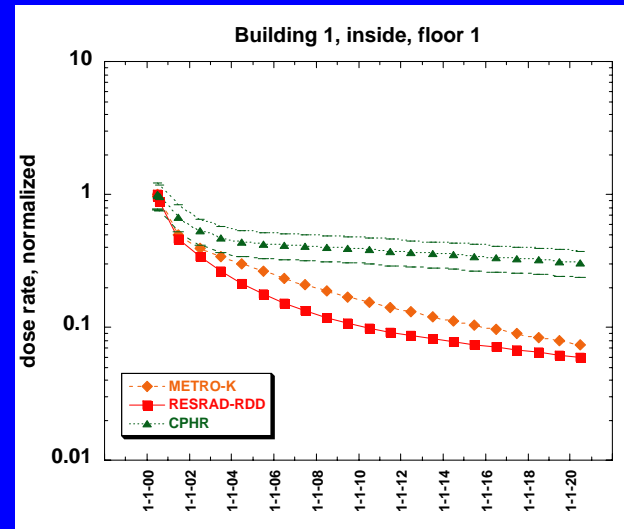
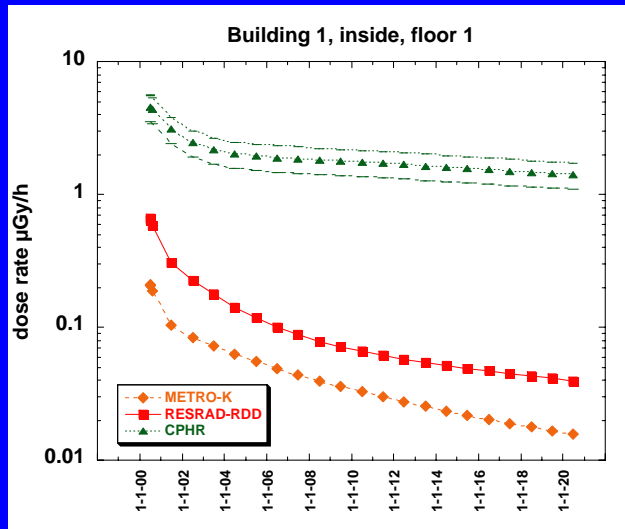
## % contribution to dose rate



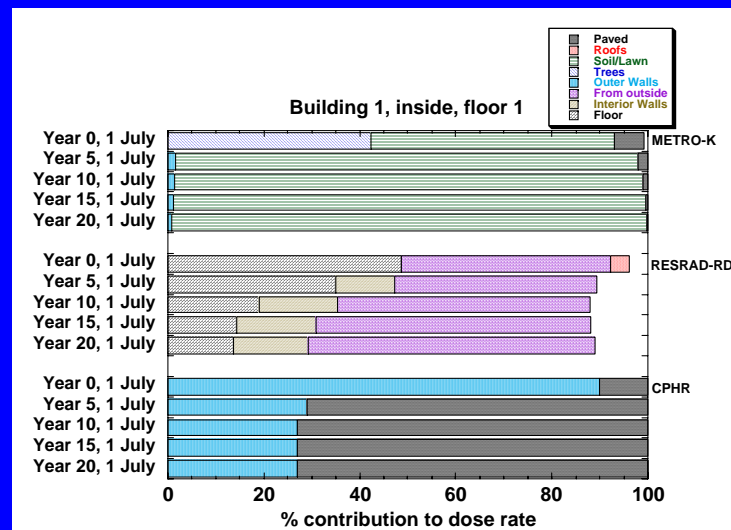


# Building 1, inside (ground floor)

## Dose rate

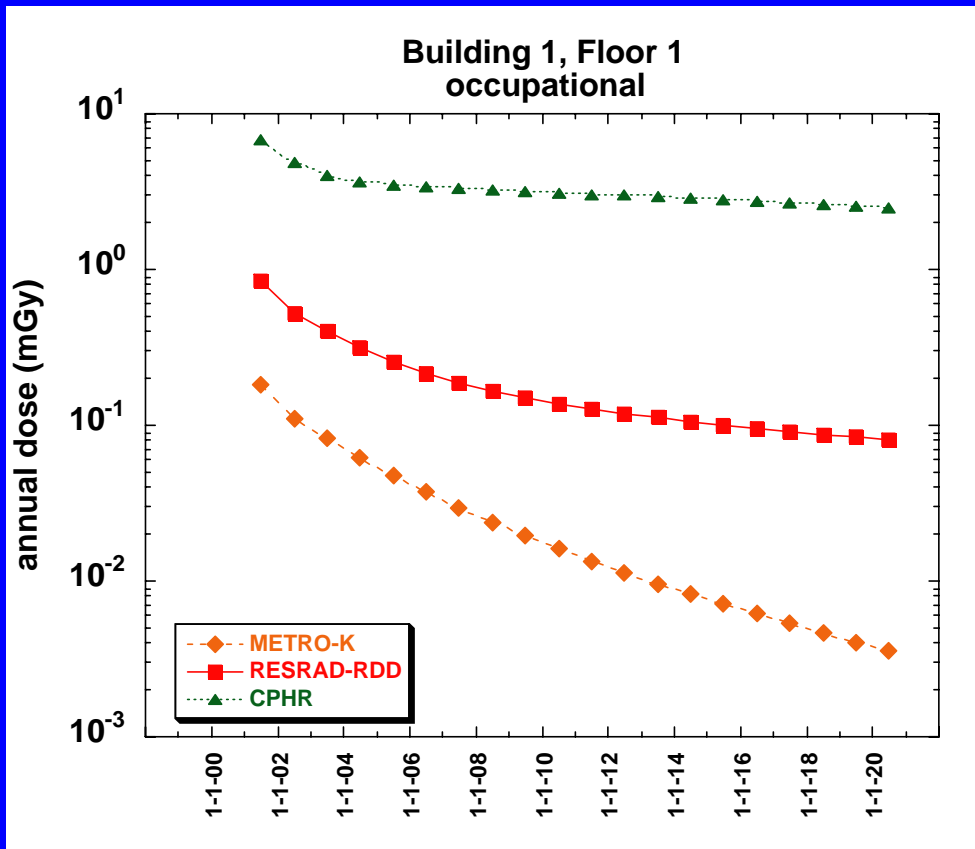


## % contribution to dose rate

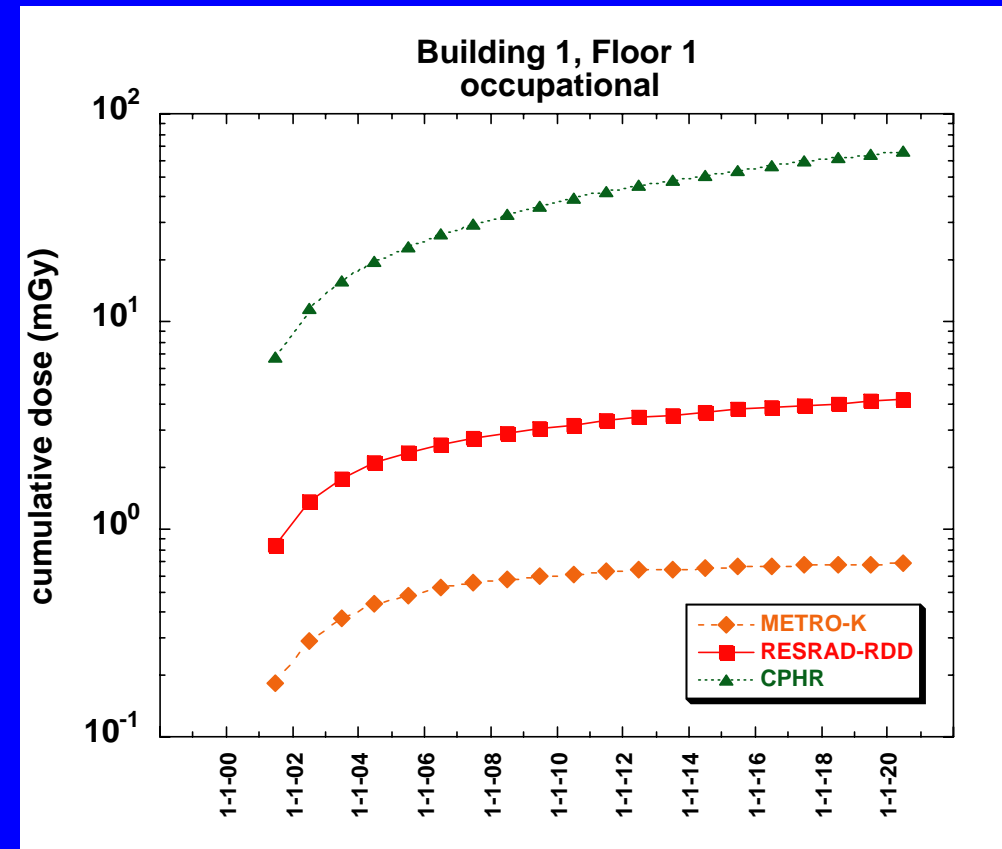


# Building 1, ground floor occupational exposure

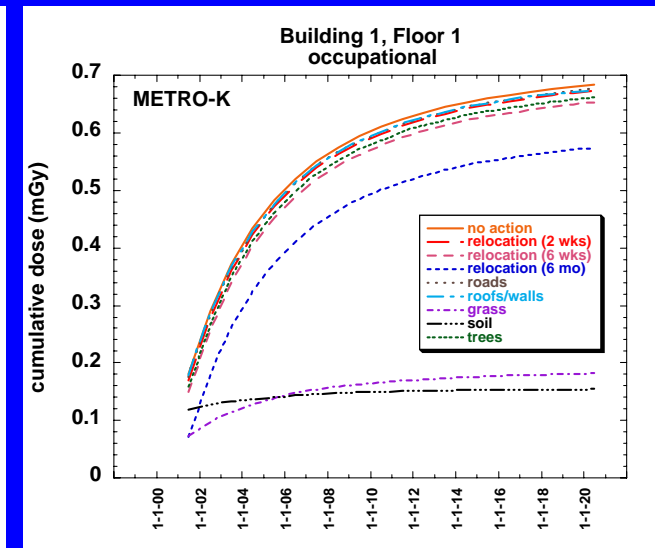
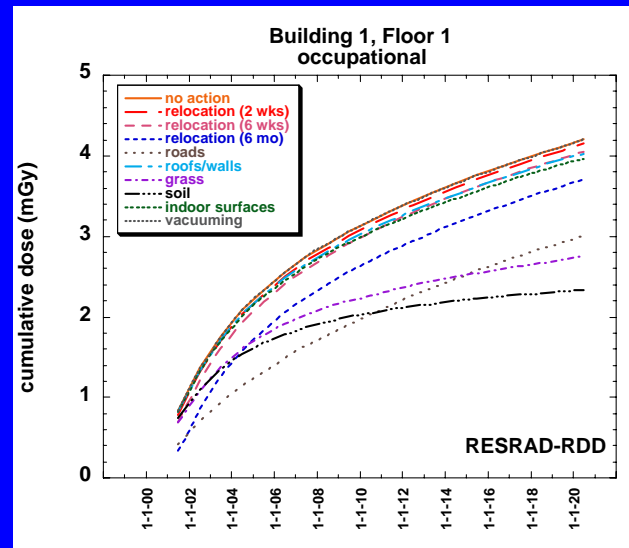
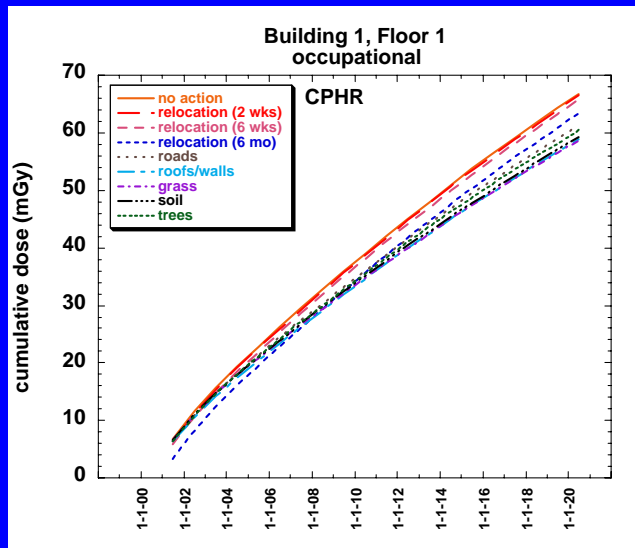
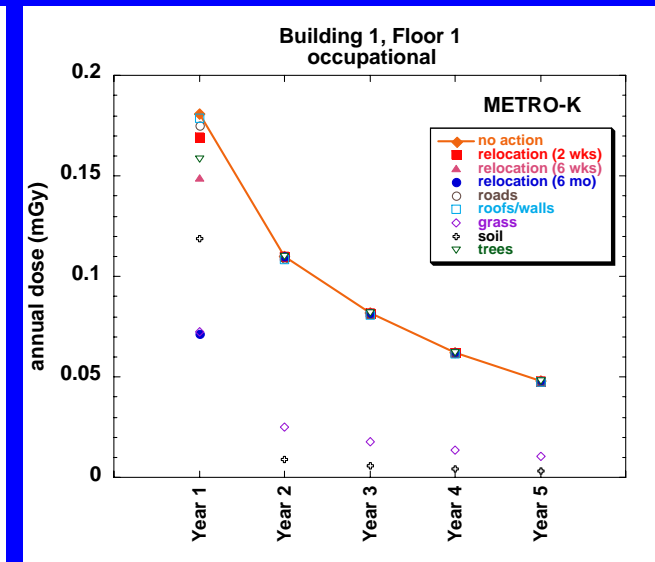
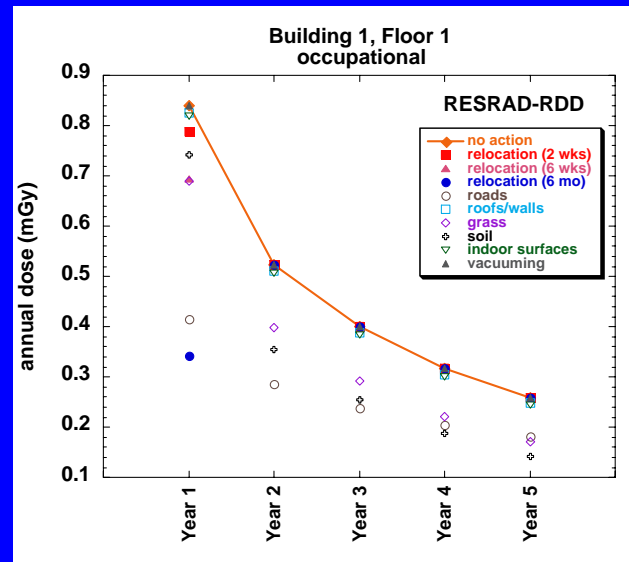
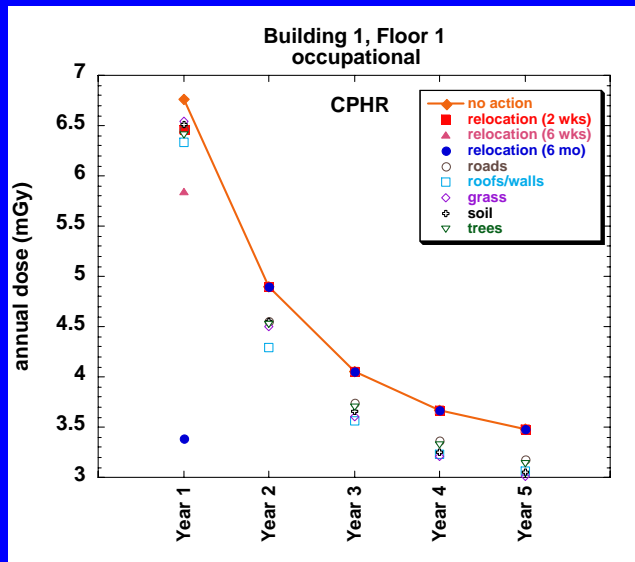
## Annual dose



## Cumulative dose



# Building 1, ground floor occupational exposure, with effects of countermeasures





# Preliminary conclusions from the Urban Remediation Working Group

- **Importance of looking at each contributing surface and radionuclide**
  - Not just the total dose rate
  - Different combinations of surfaces may give similar answers
- **Range of modeling results gives an idea of the uncertainty in making predictions**
  - Different assumptions or parameter values
  - Different interpretations of input information
  - Various sources of uncertainty
- **Need for a variety of test data**
  - Many types of data are not available
- **Challenges of this kind and scale of modeling**
  - Very location-specific
  - Many possible situations and combinations

# Plans for current meeting

- **Presentation and discussion of revised model results since the April 2007 meeting**
- **Discussion of Working Group report**
  - Models and modeling approaches
  - Results of both modeling exercises
  - Conclusions and recommendations
- **Discussion of publication plans**
- **Discussion of future plans**
  - Next steps to improving the modeling of urban contamination