



Human Health Risk Assessment Methods for PV

Part 1: Fire Risks

Introduction and Purpose

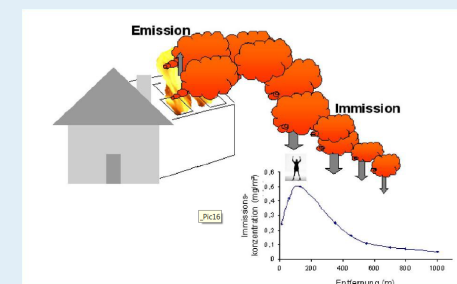
- Some stakeholders have expressed concerns regarding potential exposures to hazardous materials from fire-affected PV modules
- This study applies the human health risk assessment paradigm to the specific case of rooftop PV fires

Approach

- Screening level risk assessment methods are based on:
 - Experimental mass emission rates from fire testing
 - Gaussian plume dispersion modeling
 - Fate and transport to soil and groundwater
 - Comparisons to human health screening values
- Risk assessment methods are demonstrated by evaluating potential Pb|Cd|Se emissions from c-Si|CdTe|CIS fire-affected PV modules, respectively.



Prume, K., and J. Viehweg. LEITFADEN - Bewertung des Brandrisikos in Photovoltaik-Anlagen und Erstellung von Sicherheitskonzepten zur Risikominimierung, TÜV Rheinland and Fraunhofer ISE, 2015

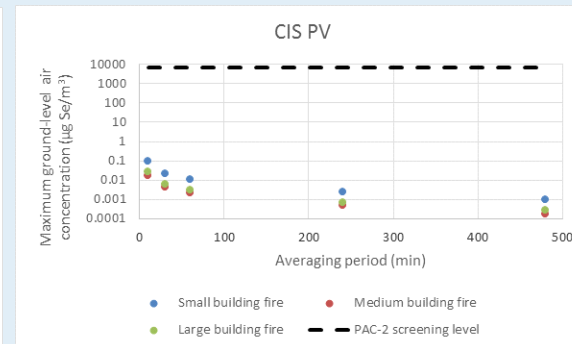
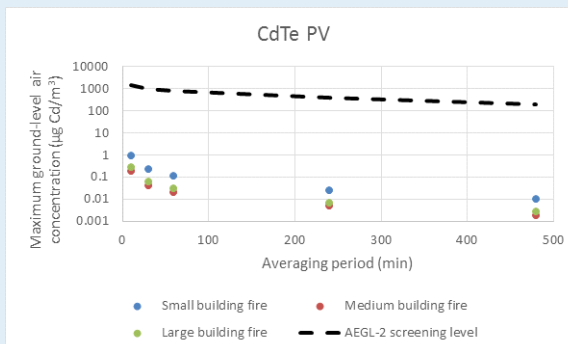
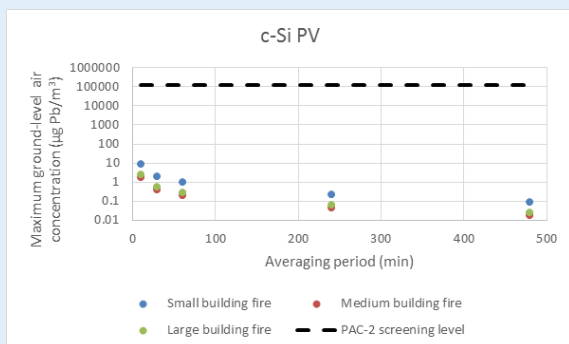


Beckmann, J., and A. Mennenga, Berechnung von Immissionen beim Brand einer PV-Anlage aus CdTe-Modulen, Bayerisches Landesamt für Umwelt (BLU), 2011, Augsburg, Germany.



Results and Discussion

- Potential Pb|Cd|Se inhalation exposures from c-Si|CdTe|CIS fire-affected PV modules, respectively, are below acute exposure guideline levels and cancer risk screening thresholds
- Potential impacts to soil and groundwater from Pb|Cd|Se emissions from c-Si|CdTe|CIS fire-affected PV modules, respectively, are below risk-based screening levels and maximum contaminant levels
- The case studies do not represent a complete human health risk assessment for fire-affected PV modules as only 3 chemicals and 3 PV technologies have been evaluated
- Screening-level methods in this report can be used to assess potential health risks from other chemicals of potential concern and other PV technologies
- Screening-level methods identify potential health risk scenarios that are greater than defined thresholds and may warrant further analysis



Maximum ground-level ambient air concentrations and acute exposure screening levels for small, medium, and large building fires with rooftop c-Si|CdTe|CIS PV