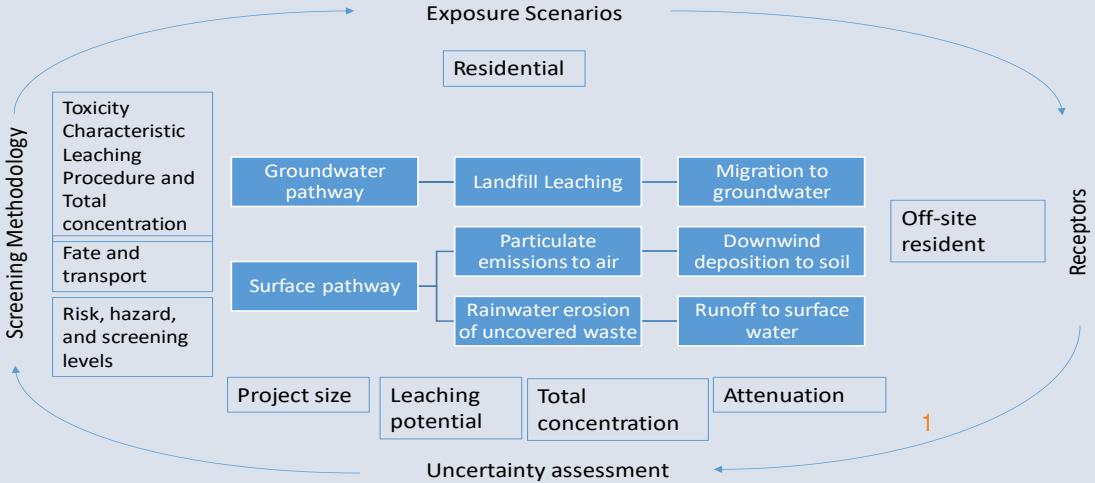
Human Health Risk Assessment Methods for PV Part 3: Module Disposal Risks

Introduction and Purpose

- Some stakeholders have expressed concerns regarding potential exposures to hazardous materials from improperly disposed PV modules
- The human health risk assessment paradigm is developed and applied to a case of non-sanitary landfill disposal
- These methods are intended to screen potential hazards justifying further assessment.

Screening Level Risk Assessment Approach

- Experimental leachate concentrations from USEPA Method 1311 TCLP
- Fate and transport to groundwater and surface (soil, surface water) pathways from USEPA DRAS model
- Risk and hazard estimates, and comparisons to human health screening values
- Risk assessment methods are demonstrated by evaluating potential Pb | Cd | Se emissions from c-Si | CdTe | CIS landfilled PV modules (10 MWac).



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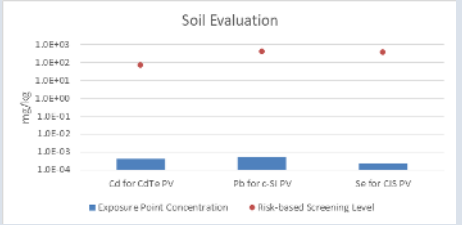
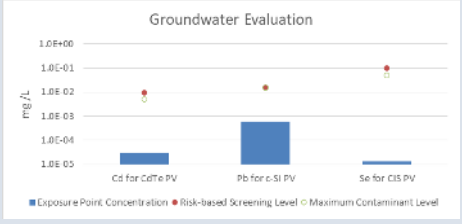
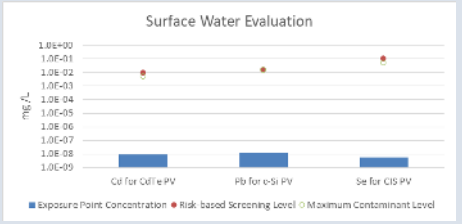
Citation: P. Sinha, G. Heath, A. Wade, K. Komoto, 2020, Human health risk assessment methods for PV, Part 3: Module Disposal risks, International Energy Agency (IEA) PVPS Task 12, Report T12-16:2020.

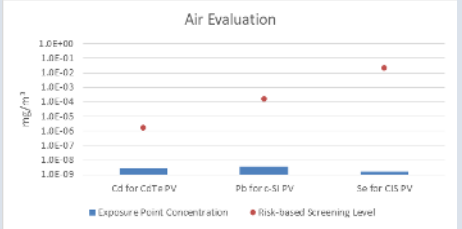
Results and Discussion

- Cancer risks and non-cancer hazards for Pb from c-Si PV, Cd from CdTe PV, and Se from CIS are at least an order of magnitude below U.S. regulatory thresholds of 1×10^{-6} cancer risk and non-cancer hazard quotient of 1. They are also lower than WHO thresholds.
- If the chemicals chosen indeed present greatest independent risk, then the results should represent the upper bound of health risk from exposure to a single constituent.
- The estimates of risk represent the likely global worst case, and in layers of other respects were made to be protective of public health.
- Screening-level methods in this report can be used to assess potential health risks from other chemicals of potential concern and other PV technologies.
- The results here are partial relative to all module constituents and not cumulative.
- Examination of potential health risk from disposal of PV modules in landfills does not endorse this end-of-life management option.
- Recycling end-of-life PV modules would further resolve environmental and material availability concerns.









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