

Human Health Risk Assessment & the Regulation of Coal Combustion Residues

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McIlvaine Hot Topics

Coal Ash Ponds and Ash Disposal Issues

January 14, 2011



Overview of Human Health Risk Assessment (HHRA)

Hazard Identification

What health problems are caused by the pollutants?



Dose-Response Assessment

What are the health problems at different doses?



Exposure Assessment

How much of the pollutant are people expected to be exposed to?



Risk Characterization

What is the extra risk of health problems in the exposed population?





2010 HHRA of Coal Combustion Residues (CCRs)

- Update of US EPA RA conducted in 2010 in support of the regulatory determination
- CCR leaching to groundwater assessment
 - 50th percentile: Arsenic and Cobalt
 - 90th percentile: Arsenic, Molybdenum, Thallium, Antimony, Boron, Lead, Nitrite, Cadmium, and Cobalt
- CCR in dust from landfill
 - Older 1998 assessment showed no risk from individual chemical constituents
 - New 2010 risk assessment showed particulate matter (PM) risks



Use of RA Results in Proposed Regulations

- In rule, US EPA requests comment on how RAs should be used in regulatory determination
 - Aim was to characterize industry as a whole
 - Introduction of substantial uncertainty and variability into RA
 - Useful for qualitative comparisons vs. quantitative risk
 - Results not applicable to any one individual facility
 - Results being used to show CCRs as “posing a substantial present or potential hazard to human health or the environment”



Use of RA Results in Proposed Regulations

- RA results used in Regulatory Impact Analysis
 - Regulatory benefits in cost-benefit analysis based on **arsenic** risks
 - Remediation costs avoided
 - Cancer cases avoided
 - Calculated this two different ways
 - Several aspects of the analysis uncertain
 - Regulatory benefits dominated by beneficial use assumptions



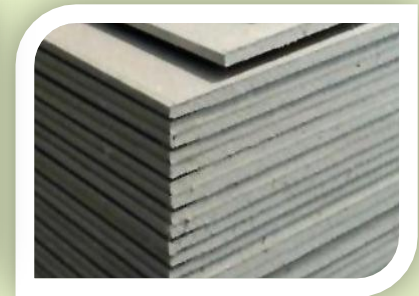
HHRA Going Forward...

- Risk assessment has played an important role in the regulatory process thus far...but where are we headed?



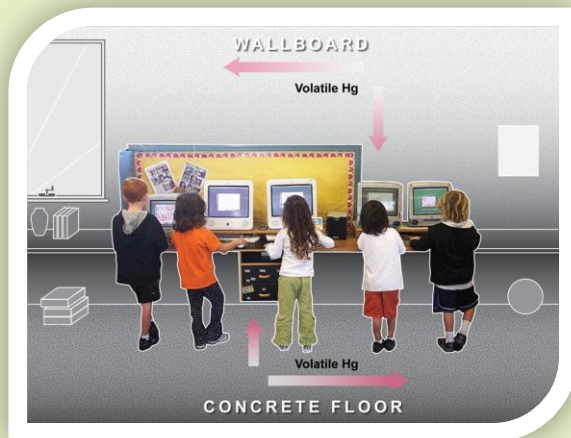
Beneficial Use

- Increased scrutiny on the beneficial use of CCRs
 - Rule notes: “encapsulated uses in concrete, and use as an ingredient in the manufacture of wallboard, provide benefits and raise minimal health or environmental concerns”
 - Unencapsulated uses (e.g., agricultural uses, use in embankments and roadways) require further evaluation
- Risk assessment is a one tool available to demonstrate safety
 - Understand chemicals of concern and exposure pathways for each use

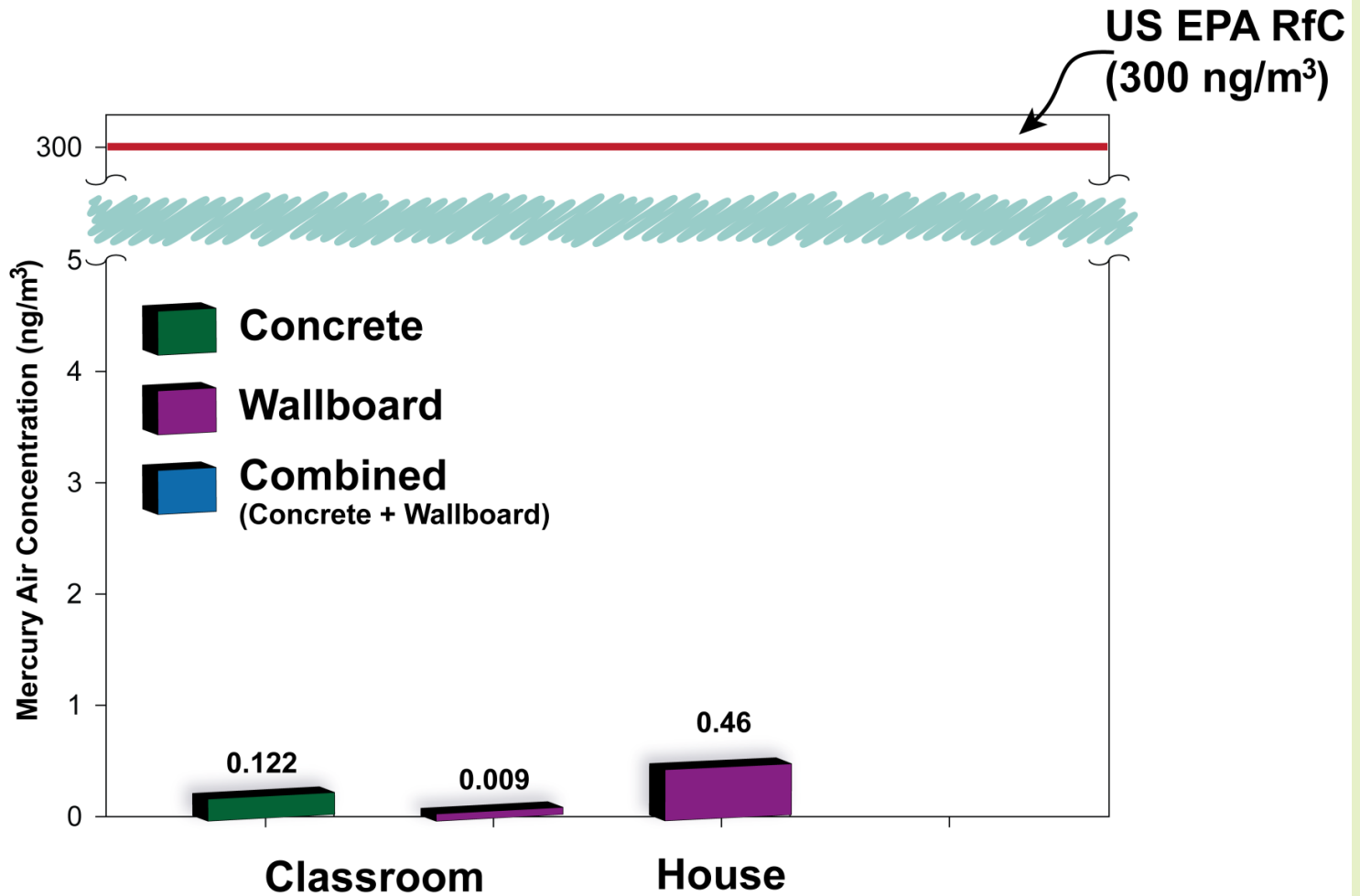


Beneficial Use

- Risk assessments on beneficial uses limited
 - US EPA examined risks associated with FGD-use as a soil amendment in 1998; in process of re-examining risks
 - For other encapsulated uses, case-by-case evaluation
- Although US EPA does not express concern with encapsulated uses, still may be a public concern
 - Important to have scientific documentation of safety and good communication!
- For EPRI, Gradient examined Hg risk from CCR use in wallboard, concrete, and structural fill
 - Modeled Hg levels were significantly below risk benchmarks and background

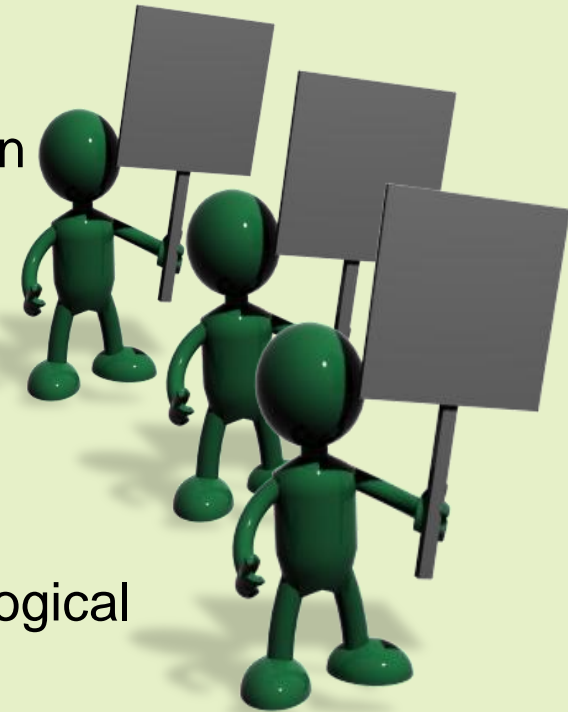


Beneficial Use



CCR Disposal

- Subtitle C
 - Mandated disposal practices
 - Federal enforcement
 - Consistency across industry of no expectation of risk, but costly (and arguably unnecessary given low risk)
- Subtitle D (or D prime)
 - Increased public scrutiny a public
 - More responsibility on individual facilities to ensure acceptable human health and ecological risks (and communicate risks)
 - Some expectation that RCRA citizen suits will be used as an enforcement tool



CCR Disposal

- Risk assessments can be used as tool to:
 - Demonstrate low public health concern
 - Identify potential problems
- Use of facility-specific data
 - Leachate/groundwater monitoring data
 - Site topography
 - Facility-specific exposure pathways
 - Water bodies used for fishing?
 - Private wells? City water?
 - Distance of communities from WMU
- Also examine ecological risks



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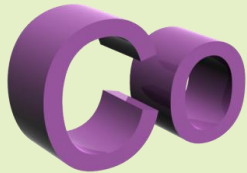
Toxicological Updates Important to CCR Risk Assessment

- **Arsenic**



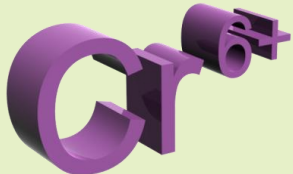
- Major risk driver in most CCR HHRAs
- Proposal to increase cancer potency 17-fold
 - Revised non-cancer assessment also slated for 2012

- **Cobalt**



- Not currently listed IRIS
- Provisional assessment shows increase in non-cancer oral criteria (67-fold)

- **Chromium (hexavalent)**



- Proposal to evaluate as oral carcinogen (has not been considered carcinogenic in the past)
- Final assessment due out this year



Summary

- Risk assessment has played and will continue to play an important role in CCR regulations
 - Can be used to demonstrate safety
 - Beneficial uses
 - Communities in the vicinity of WMUs
- Risks not static
 - Risks may change as science develops on specific chemicals



Thanks!

- Any questions?
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