

EPA Study of Emissions from Burning Pesticide Containers

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- *Journal of Hazardous Materials*, April 21, 2012
- “Emissions from open burning of used agricultural pesticide containers”
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Why conduct this study?

- During development of the draft pesticide container recycling rule, EPA gathered data on possible end points for pesticide containers (how common, environmental & health impacts)
 - Recycling
 - Landfilling
 - Incineration
 - Open burning
 - Burying/dumping



Why conduct this study?

- No data on emissions from the open burning of **rigid HDPE plastic pesticide containers**
- Other materials studied:
 - Simulated open burning of pesticide bags (Oberacker et al., 1992, Adebona et al., 1992)
 - Laboratory & open combustion of LDPE sheeting (Hosseini et al., 2009; Linak et al., 1989; Wrobel & Reinhardt, 2003)
 - Combustion of PE pellets in a laboratory reactor (Piao et al., 1999)
 - Household waste/burn barrels (Lemieux et al., 2000).

Methods

- Open burn test facility in RTP, NC
 - Enclosed building with flow-through air (16 m³/min)
- Containers placed on platform and ignited with hand-held propane torch.
- Combustion air exhausted from facility by induced draft fan, treated before released to atmosphere.
- Emissions sampled using ambient air samplers within the facility or with extractive probes from facility exhaust duct.
 - Sampling terminated when CO₂ = ambient levels

Methods



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Methods

- Samples included 2 (or 4) HDPE 2.5-gallon containers with screw cap, average mass = 400 g
- Five conditions studied
 - Clean as-received containers
 - “Unrinsed” containers with 10 mL added to clean container & lightly shaken
 - 2,4-D
 - Atrazine
 - Rinsed containers (add 10 mL, shake, triple rinse)
 - 2,4-D
 - Atrazine



Results: Emissions

- **CO and CO₂**
 - Similar
- **PCDD/PCDF:** polychlorinated dibenzo-p-dioxins and dibenzofurans
 - 2,4-D unrinsed container – statistically significant (higher)

Results: Emissions

- **PAH emissions:** polycyclic aromatic hydrocarbon compounds
 - Similar for all five scenarios
 - Comparable totals to previous studies of burning polyethylene agricultural film but with different PAH distributions
- **PM₁₀ and PM_{2.5}:** particle matter
 - Most was the smaller size (PM_{2.5})

Conclusions

- Limited number of tests
- Relatively low PCDD/PCDF are emitted from clean HDPE combustion.
- Residual 2,4-D produces more PCDD/PCDF than clean containers or triple rinsed 2,4-D containers in simulated open burning.
- Residual atrazine in containers contributed Cl to the mixture, but emissions of PCDD/PCDF seem unaffected.
- Virtually all of the particulate matter is below 2.5 μm .