

# 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 m<sup>3</sup>/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 CO<sub>2</sub> = ambient levels

# Methods



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- 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 CO<sub>2</sub>**
  - 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
- **PM<sub>10</sub> and PM<sub>2.5</sub>:** particle matter
  - Most was the smaller size (PM<sub>2.5</sub>)

# 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  $\mu\text{m}$ .