Roofing Contributions to Urban Runoff Pollution
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Introduction
- Early stormwater management assumed roof pollutant loadings were overwhelmingly due to atmospheric deposition.
- Roofing materials themselves seen as environmentally benign. Is this true?
- Literature review indicated concerns.

Methods
- Phase I: Laboratory testing (modified TCLP) was conducted on a variety of roofing materials and sealants to determine if potential for release existed.
  - UA (south east US): likely no snowmelt, no salt spray; long warm season; flashy, intense rains
  - PSH (northeast/mid-Atlantic US): salt spray from road-salt application; snowmelt; shorter warm season; generally less intense rains.
- Monitoring of the panels began in late July/early August 2006.

Questions to Be Addressed
- Given this large “store” of pollutants in the materials, would they be released in actual field conditions?
- What are the long-term concentrations/loadings from these materials?
- How does climate impact the release?

Environmental Significance
- If roofing materials are a significant source of pollutant loadings to a receiving water, they must be included both as a source in modeling and as a location needing remediation.
- Development of a model that could use rapid laboratory test results to predict field performance would assist manufacturers in developing new materials.

Objectives
- Determine the pollutant release (nutrients and metals primarily) from commonly-used roofing materials throughout their life cycle.
- Incorporate data into existing models for predicting sources and effectiveness of controls of these pollutants.

Results and Discussion of Field Testing
- Simulated rain on old roofing panels and laboratory modified TCLP on new materials demonstrated that many materials had a “reservoir” of pollutants potentially available for release.
- PSH rainfall pH ranges between 3.7 and 6. All runoff pHs were acidic (wood products and roofing felt consistently below pH 4.5).
- PSH field testing results:
  - Conductivity measurements began to stabilize after ~20 days (to < 300 µS/cm).
  - COD levels initially high; highest concentrations associated with wood products.
  - Elevated nitrate levels seen for roofing felt, cedar shingles (< 50 mg/L).
  - Higher ammonia levels: waterproof (CCA + organic preservative) wood, shingles.

Questions to Be Answered
- If roofing materials are a significant source of pollutant loadings to a receiving water, they must be included both as a source in modeling and as a location needing remediation.
- Development of a model that could use rapid laboratory test results to predict field performance would assist manufacturers in developing new materials.

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Conclusions and Future Research
- Uncoated galvanized metals and wood primary concerns for pollutant release.
- Zinc is the sacrificial cation in many galvanizing applications.
- CCA (or modified-CCA) preservatives used in wood.
- Nutrient releases seen early in several material’s lives, with rapid reductions in runoff concentrations seen after several storms.
- The aged roofing panels showed that some materials will release measurable concentrations of pollutants over their entire life.
- Future research: Long term testing using actual rainfall, UV exposure and freeze-thaw cycle should result in data comparable to laboratory test results.
- End products: modeling of pollutant release over material’s life and development of rapid testing method to mimic long-term releases.