

KING COUNTY, WASHINGTON  
**SURFACE WATER DESIGN MANUAL**

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**REFERENCE 11-E**  
**ROOFING ERODIBLE OR LEACHABLE**  
**MATERIALS**

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## REFERENCE 11-E

### ROOFING ERODIBLE OR LEACHABLE MATERIALS

#### Metal roofing coating: Inert, non-leachable material

Metal roofs are considered to be pollution generating impervious surface unless they are coated with:

- ~~PVDF (Polyvinylidene Fluoride) with a manufacturer's 25-year or better guarantee of no material that prevents metals leaching and is not itself an erodible or leachable source of any pollutant, has a 25 year or better guarantee of coating longevity, and neither manufacture of the material nor application to roofing nor fire nor disposal presents unacceptable environmental harm or human health risk;~~ and
- are not subject to venting significant amounts of dusts, mists, or fumes from manufacturing, commercial, or other indoor activities.

There is currently no metal roofing coating that has been found to prevent underlying metal leaching, is itself not an erodible or leachable source of any pollutant during normal use, and its manufacture, application, or fate is not a source of unacceptable<sup>1</sup> environmental harm or human health risk.

#### Non-metal roofing types that may pose risk but are not currently regulated

The following roof types are currently not regulated as pollution generating surfaces, but there is some evidence that they may pose risks to water quality. This information is provided to assist the public in making more informed choices.

These roof types include any roofing manufactured or treated with biocides for moss, algae, rot, or plant control; i.e. those containing any heavy metal such as copper, lead, zinc, silver, or arsenic, or organic biocides such as (R,S)-mecoprop bi-ester<sup>2</sup> and terbutryn, carbendazim, and Irgarol 1051<sup>3</sup>.

Other roof types that may pose risk include synthetic roofing materials that use zinc or any other leachable heavy metal as a manufacturing catalyst or for any other purpose, any roofing material containing any heavy metal as a UV stabilizer or for pigmentation<sup>4</sup>. Phthalates have also been noted as leaching from some synthetic roofing.

<sup>1</sup> Formerly allowed PVDF coating is manufactured with PFAS, and as such is no longer an acceptable coating.

<sup>2</sup> Bucheli, Thomas D., Stephan R. Müller, Andreas Voegelin, and René P. Schwarzenbach. 1998. Bituminous Roof Sealing Membranes as Major Sources of the Herbicide (R,S)-Mecoprop in Roof Runoff Waters: Potential Contamination of Groundwater and Surface Waters. Environmental Science & Technology 32 (22):3465-3471.

<sup>3</sup> Background literature review in support of the regional study by Ecology. Winters, Nancy. 2013. Quality Assurance Project Plan. Roofing Materials Assessment: Investigation of Toxic Chemicals in Roof Runoff. Publication No. 13-03-105. Lacey, WA: Washington State Department of Ecology.

<sup>4</sup> Polybrominated diphenyl ethers (PBDE) or other fire retardants may be an issue in Central and Eastern Washington, but according to manufacturers on Ecology's Roofing Task Force, these are not applied in Western Washington.

## Specific Examples Of Non-Metal And Coated Metal Roofs For Which There Is Documented Evidence<sup>5</sup> Of Some Runoff Risk

### Roofs with potential risk based on regional monitoring of regionally supplied materials<sup>5,6</sup>

- Asphalt shingles with algae resistance (AR)
- EPDM (ethylene propylene diene monomer)
- Manufacturer-painted galvanized steel, painted with silicone-modified polyester paint<sup>7, 5</sup>
- PVC (polyvinyl chloride)
- Treated wood shakes

### Roofs with potential risk based on other Studies<sup>7</sup>

- Asphalt shingles
- Asphalt fiberglass shingles
- Asphalt (residential)
- Asphalt impregnated with copper
- Asphalt roofs with moss-control zinc strips
- Bituminous roof sealing membrane for green roof, treated to inhibit root penetration
- Built-up commercial
- Built-up with coal tar
- Cedar shakes
- Ceramic tile
- Clay tile
- Concrete tile
- Ethylene propylene diene monomer (EPDM or rubber roofing)
- Galfan (aluminum-coated)
- Gravel
- Impregnated wood
- Ondura
- Painted steel
- Pressure treated / water sealed wood
- Polyester
- Polyvinyl Chloride (PVC)
- Synthetic roofing materials, e.g. thermoplastic olefin (TPO)

<sup>5</sup> Materials provided by Western Washington manufacturers and/or vendors. First year of study. Winters, Nancy, and Kyle Graunke. 2014. Roofing Materials Assessment - Investigation of Toxic Chemicals in Roof Runoff. Lacey, WA. <https://fortress.wa.gov/ecy/publications/SummaryPages/1403003.html>

<sup>6</sup> Materials provided by Western Washington manufacturers and/or vendors. Winters, Nancy, Melissa McCall, and Allison Kingfisher. 2014. Roofing Materials Assessment - Investigation of Toxic Chemicals in Roof Runoff from Constructed Panels in 2013 and 2014. Publication No. 14-03-033. Lacey, WA.

<sup>7</sup> Background literature review in support of the regional study by Ecology. Winters, Nancy. 2013. Quality Assurance Project Plan. Roofing Materials Assessment: Investigation of Toxic Chemicals in Roof Runoff. Publication No. 13-03-105. Lacey, WA: Washington State Department of Ecology.

- Rubber
- Treated roofing materials (non-specific as cited)
- Vegetated roof
- Wood shingle

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