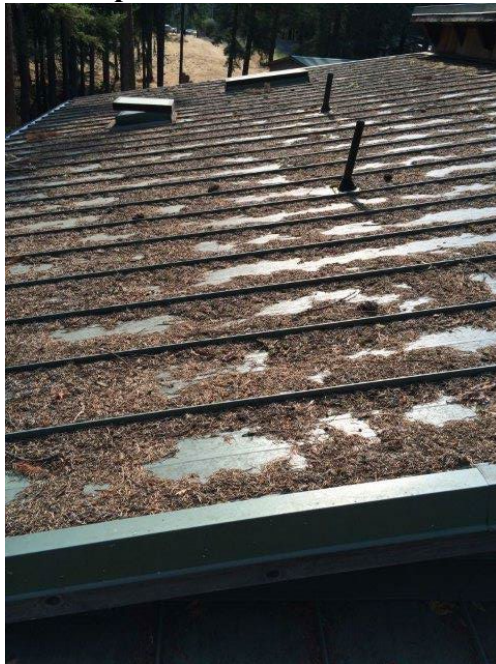


## Pine Straw Build-Up on Prepainted Metal Roofing

An issue, while not limited to the US Pacific Northwest, but certainly prevalent there, is the accumulation of pine needles (also called “pine straw”) on prepainted metal roofing. Although metal roofing is better than asphalt shingles when it comes to shedding leaves, twigs, pine straw, etc., there will be occasions when build-up may occur. See an example below.

### Build-Up of Pine Straw

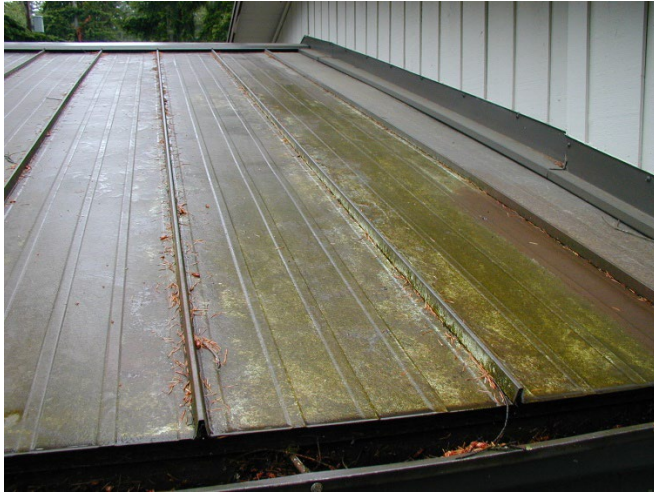


Source: Steelscape

In many cases, this build-up may be harmless, but some failures of the prepainted metal have been noticed where build-up—especially of pine needles—has occurred, as shown here:

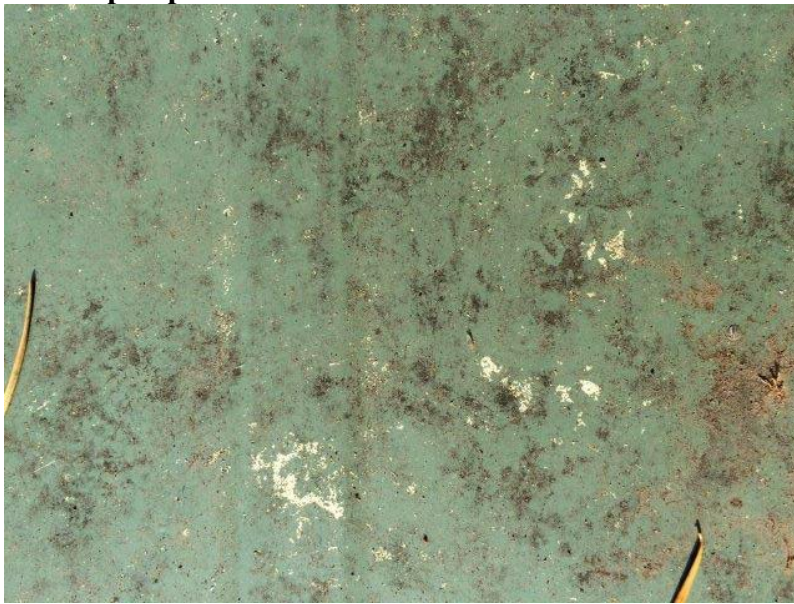
This Tool Kit is part of a series of educational aids developed by the members of the National Coil Coating Association. NCCA is a trade association of coil coaters and suppliers of raw materials and equipment used in the coil coating process. The association concentrates its efforts on providing educational resources and assisting its members in providing superior products and services to their customers. NCCA Tool Kits are information tools and should not be used as substitutes for instructions from individual manufacturers. Always consult with individual manufacturers for specific instructions regarding their products and equipment.

### Panel condition after removal of an accumulation of pine needles



Source: Steelscape

### Close-up of painted surface after removal of an accumulation of pine needles



Source: Steelscape

There are two primary failure pathways that may explain such failures:

1. Water saturating the pine straw debris on the roof. Long-term exposure of a paint system to moisture may present a problem under some conditions. Although prepainted metal is very resistant to moisture ingress, all coatings and sealants have some degree of permeability, so it is always advisable to avoid any condition where moisture is trapped against a prepaint metal surface.

2. All biologic materials are very complex mixtures of a great many of organic compounds. Oak leaves contain tannins, which are mildly acidic. Pine needles are particularly interesting. The various species of pine trees produce varying types—and varying amounts of—organic compounds. Perhaps the most common chemicals are:
  - a. Anethole: also known as anise camphor, widely used as a flavoring
  - b. Linalool: a terpene alcohol, with a very pleasant scent
  - c. Terpeneol: often used in perfumes and flavorings, because of its lilac odor
  - d. Eugenol: an oil also found in clove, nutmeg and cinnamon.
  - e. Limonene: This is the organic compound of greatest concern. Although it is chemically similar to the above compounds, it has one distinctly different property. Limonene has been formulated into a number of “green” paint strippers, and also can be used as a cleaning solvent for removing oils on machine parts. In addition to pine needles, limonene is found in the peels of citrus fruits.

An internet search for “natural paint stripper” reveals many commercial products, the safety data sheet for one of which shows the active ingredient to be:

Name	Product Identifier	% by weight	GHS-US classification
D-Limonene	CAS # 5989-27-5 EINECS # 227-813-5	3-20%	Flammable liquid 3, H226 Skin corrosion/irritation 2, H315 Sensitization skin 1, H317 Aspiration hazard 1, H304

These “green” strippers are not nearly as aggressive as past strippers that contained a number of aggressive and hazardous chemicals. It is easy to conceive of a situation, however, where a pile of pine needles, resting on a pre-painted metal roof for months or years, would release enough limonene to attack the painted surface and perhaps even the metallic-coated steel or aluminum substrate.

Prepainted metal will provide decades of performance, but it is important to avoid pooling water and build-up of water-laden debris, especially pine needles. It is, however, beyond the scope of this document to specify how this is to be done. Reputable suppliers of prepainted metal can provide specific maintenance and cleaning guidelines.