I can see frost on the underside of the roof in the attic. What’s causing this?

The frost is the result of water vapor condensing. As the air in the attic cools, it can no longer hold the same amount of moisture. Cold surfaces, such as the back side of roof plywood, and any exposed nail points through that plywood, will become ready targets for condensation, which will take the form of frost. Water staining in this area can indicate a long-term problem.

Most roofs in Fairbanks are designed to be ventilated, particularly those that contain an attic space with an insulated ceiling underneath. A properly vented roof will usually have several points where outside air can enter and attic air can escape. Ideally outside air should enter at the eaves, to replace attic air that exhausts through ridge or gable vents. This creates a continuous cycle.

2013 local code requires a minimum continuous 1.5-inch ventilation space at the eaves as well as a specific amount of additional ventilation in the upper third portion of the roof space to ensure good air circulation. By this standard, many older homes are inadequately ventilated, and some may lack vent spaces either at the top or bottom of the attic.

Adequate ventilation does not address the source of the water vapor; it only minimizes the effects. The real solution is to find out where the moist air is coming from.

In almost all cases, moist indoor air is escaping through some portion of the ceiling and entering the attic. Sometimes air leakage is easy to find because frost will appear at the leak, such as around chimney penetrations, dryer and bathroom ducting and poorly sealed electrical fixtures in the ceiling. At other times, frost may be uniformly distributed throughout the attic, with no obvious source of moisture.

At this point, you can start digging in likely locations, but if that doesn’t turn up any clues you may have to go one step further.

An energy rater with a blower door can depressurize the house and then scan the ceiling with an infrared camera to look for cold spots where air is getting pulled in by the fan. This method is usually very effective as the air getting pulled in through the holes in the ceiling is much colder than the air in the living space and problem spots will light up on an infrared camera display.

If you are considering adding insulation to an older roof, take the time to inspect things carefully before installation and do any necessary air sealing.