Over the course of the season, we get a lot of questions about snowmaking. Those questions usually sound like this…. “It was freezing last night, why didn’t you make snow?” or “How does snowmaking work?”

We have put this page together to help eliminate some of the mystery of snowmaking. But first and foremost, the snow we make is REAL snow. There is nothing fake or artificial about the snow itself, we are just duplicating the same things Mother Nature does, we just do it better, and when we say it’s going to snow, we mean it. We are SNOWMAKERS, not meteorologists.

Two of the Most Important Variables in Making Snow are:

Temperature & Humidity – The relationship between temperature and humidity is called Wet bulb Temperature. Both Temperature and Humidity must be low enough for Snowmaking.

The Science of Snowmaking

How does it work?

The science of snowmaking can be quite complex. Snowmaking in its simplest form is the act of turning water into small ice crystals (snow). Four things come into play to make this happen: ambient temperatures, evaporation, surface area, super cooling.

Ambient Temperature

First it must be cold outside. Even when the outdoor temperature is below freezing (32°F) snow quality can be poor or slushy. This is because much of the water is not staying or even turning into the frozen state. If you refer to our snowmaking weather chart, you will see what the ideal temperatures are for snow making.

Surface Area

The third way the water is cooled is by increasing the surface area of the drop. By increasing the surface area, we expose as much of the water to the cold as possible. The smaller we make these drops, the greater the surface area to volume ratio. We achieve the proper drop size and spray pattern through highly specialized nozzles.

Super Cooling

Finally we need to look at super cooling. When a compressed gas (in this case air) is allowed to rapidly expand, there is a decrease in temperature. This is known as the Joule-Thomson Effect. The conditions at the air nozzle are such that the mist coming from the nucleation nozzle is able to immediately freeze. These tiny ice crystals are then drafted into the larger upper mists which seed and snap the pre-cooled water droplets into a frozen state. The result is snow that then falls out of the mist.

Evaporation

The second factor is heat loss through evaporation. As some of the water evaporates from the surface of the drop a small amount of heat is removed from the drop itself. Try putting some rubbing alcohol on your arm. As it evaporates you will experience this cooling effect. Your body uses this process of evaporation to cool itself, we call it sweating. When the air is humid, there is already a lot of moisture in the air. Your sweat is less readily absorbed into the air and is unable to evaporate from your skin removing the heat with it.

The same premise happens in snowmaking. When there is high humidity, the water droplet’s surface is not able to evaporate a small amount of water and remove some of the heat. Therefore, in snowmaking we must refer to the “Wet Bulb Temperature”. This is a measure of the ambient temperature that takes into account the cooling effect the humidity in the air allows for.

CREW

Most important to the snowmaking operation is our dedicated crew. Without these guys coming in working day and night in the harshest of conditions, usually while getting very wet, we would not be able to get the area open for skiing and riding. We hope you have enjoyed learning about what it takes to make snow at a ski area, and found this information useful. Next time you see the crew out there, Thank them for their hard work getting that fine corduroy laid out for the awesome experience that is skiing and snowboarding.