Cloud seeding—a form of weather modification—is a safe, scientific, time-tested, and proven set of technologies used to enhance rain and snow, reduce hail damage, and alleviate fog. The benefits of cloud seeding can be measured in additional water for cities and agriculture, as well as the reduction of damage from severe weather.

A ground-based generator is used to burn a silver iodide solution to release microscopic silver-iodide particles which can create additional ice crystals, then snow, in winter clouds. Research has shown that placing equipment at high elevations increases cloud seeding effectiveness.

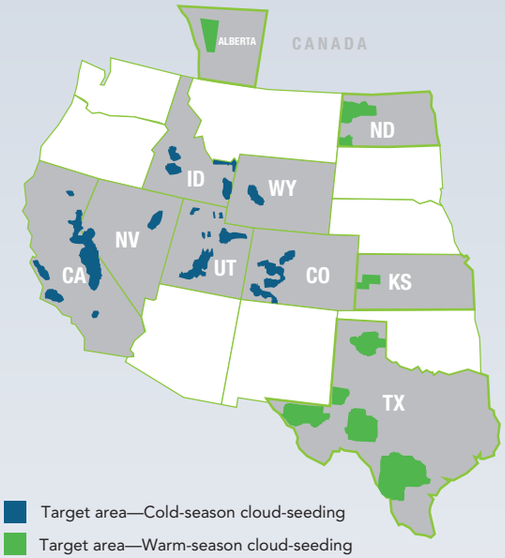
Cold Season Seeding

When moist air flows over the mountains, water vapor condenses and forms clouds composed of water droplets. These droplets become "super cooled" and have the unique quality to remain liquid even at temperatures below freezing. Given enough time and mixing with surrounding air, many of the droplets will evaporate, but under the correct conditions some will eventually become ice crystals, grow into snowflakes and precipitate to the ground. Cloud seeding provides an opportunity to increase the number of ice crystals that can become snowflakes.

Who Conducts Cloud Seeding?

In North America, cloud-seeding programs are conducted in California, Colorado, Idaho, Nevada, Utah, Wyoming, Kansas, North Dakota, and Texas, as well as Alberta, Canada.

Cloud seeding is also conducted through major programs in the countries of Australia, Chile, China, France, Greece, India, Israel, Saudi Arabia, and Spain.



Target area—Cold-season cloud-seeding

Target area—Warm-season cloud-seeding

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NAWMC Members

California Department of Water Resources
Colorado Water Conservation Board
Desert Research Institute
North Dakota Atmospheric Resource Board
Texas Department of Licensing and Regulation
Utah Division of Water Resources
Wyoming Water Development Office

NAWMC Associate Members

Central Arizona Water Conservation District
Metropolitan Water District of Southern California
Santa Barbara County Water Agency
Idaho Power Company
North Dakota Weather Modification Association
Sandy Land Underground Water Conservation District

UNDERSTANDING COLD SEASON Cloud Seeding

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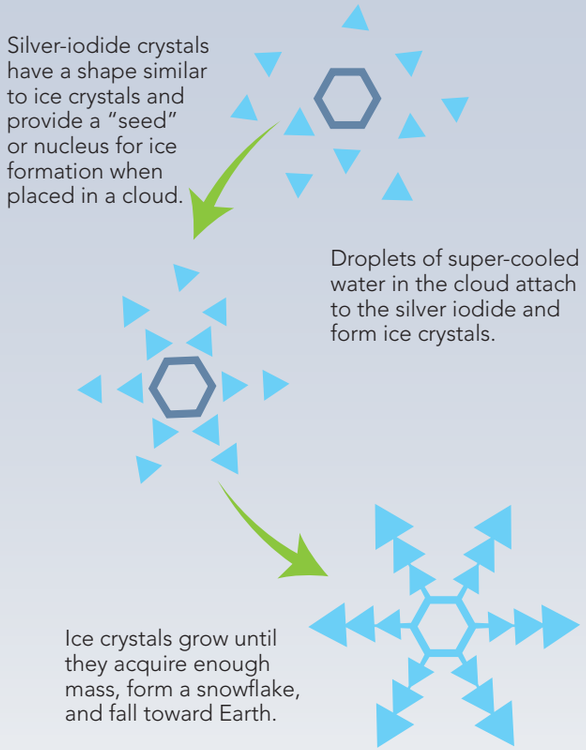
Inducing the formation of ice crystals in a cumulus cloud



Super-cooled water

Silver-iodide crystal

Ice crystal

WEATHER MODIFICATION

Cold Season Cloud Seeding

The Science

The cloud-seeding process aids precipitation formation by enhancing ice crystal production in clouds. When the ice crystals grow sufficiently, they become snowflakes and fall to the ground.

Silver iodide has been selected for its environmental safety and superior efficiency in producing ice in clouds. Silver iodide adds microscopic particles with a structural similarity to natural ice crystals. Ground-based and aircraft-borne technologies can be used to add the particles to the clouds.

Safety

Research has clearly documented that cloud seeding with silver-iodide aerosols shows no environmentally harmful effect.

Effectiveness

For cloud seeding to improve snowfall, super-cooled droplets—moisture and clouds—must be present, but studies have documented cloud seeding's ability to increase the frequency and amount of snowfall, given the right atmospheric conditions. The effects of cloud seeding can sometimes be seen within 30 minutes, but more generally between 30 minutes and an hour.

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Snowpack/Water Enhancement

1. Moist air rises as it flows over the mountains, cooling and creating clouds composed of super-cooled water droplets.
2. Minute amounts of silver iodide in solution are sprayed across a propane flame or released from an aircraft-mounted flare. The air flow up the mountain barrier carries the particles into the clouds.
3. The silver-iodide crystals provide nuclei for the formation of ice crystals.
4. By freezing of droplets and deposition of vapor, ice crystals form and grow progressively larger, forming snowflakes large enough to precipitate to the ground.

To find out more about weather modification and participating agencies, visit the North American Weather Modification Council online at www.nawmc.org