



Wyoming Cloud Seeding Experiment Begins This Month

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BOULDER— A five-year, \$8.8 million pilot project to examine whether seeding clouds with silver iodide produces a measurable increase in snowfall over Wyoming's Medicine Bow, Sierra Madre, and Wind River mountain ranges starts this month with intensive observations of Wyoming snow clouds. Scientists from the National Center for Atmospheric Research (NCAR) designed the experiment to evaluate a technique that has been mired in controversy for decades.

NCAR and partner institutions are deploying both airborne and ground-based instruments from January 16 to February 13 and again from March 10 to 31 to gather key data for the project. Microwave radiometers are capturing variations in snow-producing clouds over the target areas, including amounts and duration of water vapor and liquid water in the clouds. Instruments at selected sites are tracking precipitation rates, common meteorological variables, background air quality, and ecosystem characteristics. NCAR's partners in the observations include the University of Wyoming, the South Dakota School of Mines and Technology, the Desert Research Institute, and the U.S. Forest Service.



NCAR's Tara Jensen and Dan Breed (standing) align a radiometer with Jason Goehring of Weather Modification, Inc. (Photo by Terry Krauss, WMI.)

Weather Modification, Inc., a private company based in Fargo, North Dakota, has been contracted to seed the target area's snow clouds. WMI is also providing a research aircraft and several ground-based instruments for this year's observations.

Cloud seeding is big business. Western states spend millions each year seeding clouds with silver iodide to increase snow or rain, but studies to evaluate the method's effectiveness, at least on a large scale, have been inconclusive. The Wyoming Water Development Commission (WWDC) has funded the Wyoming Weather Modification Pilot Program to resolve whether cloud-seeding might provide Wyoming users with a low-cost source of fresh water.

water in additional runoff each spring, according to a WWDC report. Conservative estimates value the extra water between \$2.4 and \$4.9 million. These numbers do not include values for generating more hydroelectric power, enhancing recreation and tourism, improving water quality, and other environmental benefits. At \$6.60 to \$13.00 per acre-foot, the technique would be a bargain; water from Wyoming's new High Savery Dam runs \$158.93 per acre-foot, according to the WWDC.

Wyoming has suffered years of drought, with many of its reservoirs still running low. Air pollution from human activities may have worsened the problem. If cloud seeding proves to be effective, the additional snowpack would raise reservoir levels and help protect the state during dry years ahead.

Even a modest 10% increase in snowpack in the project's targeted areas would provide between 130,000 and 260,000 acre-feet of

"People are sometimes concerned about changing what they think is natural weather," says NCAR project scientist Dan Breed, "but studies have shown that in some areas we're already affecting clouds unintentionally through increases in airborne particulates and other pollution. If cloud seeding is shown to work," he adds, "it may help counteract the effects of air pollution as well as ease those of natural drought cycles."

"The challenge is to determine whether snowfall levels would have occurred anyway, or clearly resulted from the seeding," says NCAR scientist Roelof Brientjes. Even a 10% increase would fall within the range of natural variability of a single storm or a whole season, he adds. "To attribute cause, we need this kind of careful, objective analysis independent of the operations."

Decades of ongoing winter weather research, improved techniques for releasing chemicals into clouds, and better forecasting and assessment tools are giving scientists a leg up in the new pilot program, which combines operational seeding with sophisticated scientific evaluation.

Starting next winter, pending permits, 24 ground-based generators will burn a silver iodide and acetone solution, creating plumes of silver iodide particles aimed at clouds upwind and over the target areas. Simultaneously, a Piper Cheyenne II twin-engine turboprop airplane will burn flares mounted on its wings to inject silver iodide into clouds two thousand feet or higher above the ground. Silver iodide's ice-like particles attract the cloud's liquid water, which freezes around the particles to form snow.

Related sites on the World Wide Web

[Wyoming Cloud Seeding Pilot Program](#)
[Wyoming Water Development Commission](#)
[Weather Modification, Inc.](#)



WMI's Piper Cheyenne II. (Photo by Tara Jensen, NCAR.)

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