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Cooperative Extension South Dakota State University

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**FS 561**  
(4th in a series)



# South Dakota's Weather Modification Program

**Cooperative Extension Service  
South Dakota State University, Brookings  
U. S. Department of Agriculture**

# South Dakota's Weather Modification Program

By  
**Martin Schock**, assistant director,  
 South Dakota Weather Modification Control Commission

Research on modifying certain types of clouds in South Dakota, other U. S. states, and in other countries has developed the technical abilities to produce more rain. The results of these studies, as applied to South Dakota clouds, are:

1. The growing season rainfall can be increased from 8%-15%. This is 1 to 2 inches more rainfall during the summer months.
2. Some types of clouds and clouds with certain characteristics are not suitable for seeding.
3. The rainfall will continue to be variable from month to month and year to year. It will also continue to vary from farm to farm.
4. Some methods of seeding give better results than others. Some materials work better than others.

Researchers at South Dakota State University estimate that 1 additional inch of *seasonal* rainfall will increase corn yields an *average* 4.0 bushels per acre and wheat yields an *average* 1.7 bushels per acre. Production of other crops and forage will also increase.

The *total* cost of operating a cloud seeding project has been estimated by the South Dakota Weather Control Commission to be between 2 and 3 cents per acre.

Additional benefits will accrue by reducing hail damage. Research on seeding storms in the Soviet Union to reduce hailfall has indicated 80% less hail. An operational hail reduction project in Kenya, Africa claims 70% less damage to tea crops. An 11-year project in southwestern North Dakota suggests that storm intensities are decreased by cloud seeding. Results of experimentation by the Institute of Atmospheric Sciences at the South Dakota School of Mines and Technology indicate that seeding will reduce hail about 50%.

## Project Areas

The design of the program calls for a series of field projects or Weather Modification Districts. Each District consists of several counties to form a target area of about 100 miles in diameter as shown in Figure 1.

Participation is strictly on a voluntary basis by county. The participating counties are required to cost-share 25% of the costs of operating the project. A multi-county structure provides improved financial

support to insure that adequate equipment, personnel, and support services are available to conduct a sound program.

## Project Control

Staff in the office of the Weather Control Commission will design the methods by which clouds will be seeded using experience of private operators and research groups throughout this country and the world.

An advisory board composed of a representative of the Board of County Commissioners from each county in the Weather Modification District coordinates the needs of the counties.

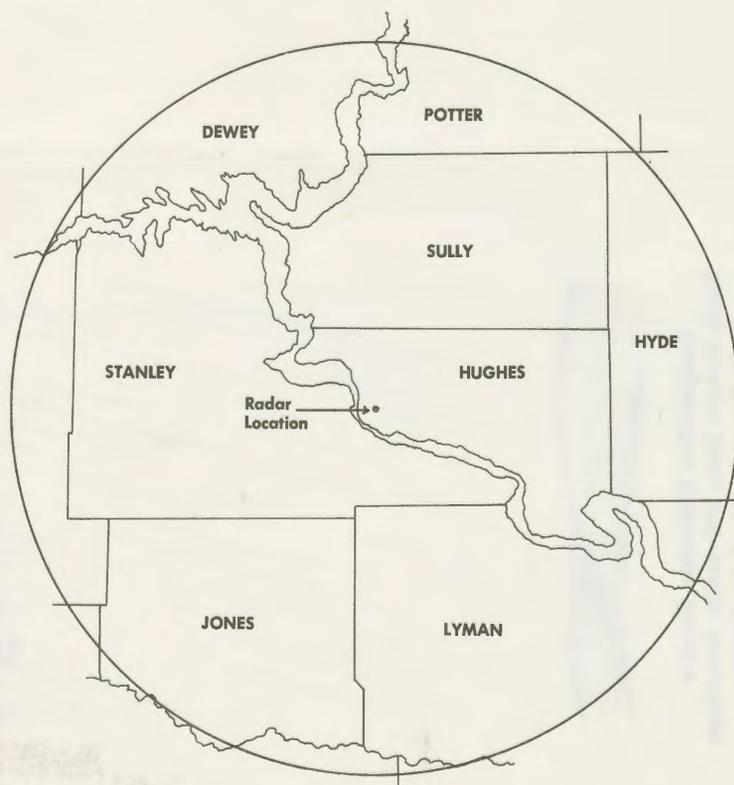
The primary function of this board is to review the cloud seeding operations at regular monthly meetings. Each week brief reports of seeding activities will be mailed to each member. The board can recommend discontinuance of seeding in whole or in part of the district if it feels that precipitation has been adequate.

## Project Equipment

One weather surveillance radar will be centrally located in each District. These radar can detect rain showers at distances of 50 miles and large thunderstorms at distances of 100 miles.

Figure 2 shows a radar display of precipitation areas called echoes. The intensity of echoes and their appearance are clues to the type of cloud the radar is "seeing." Following the echo on the radar display

Figure 1. An example of a Weather Modification District about 100 miles in diameter.



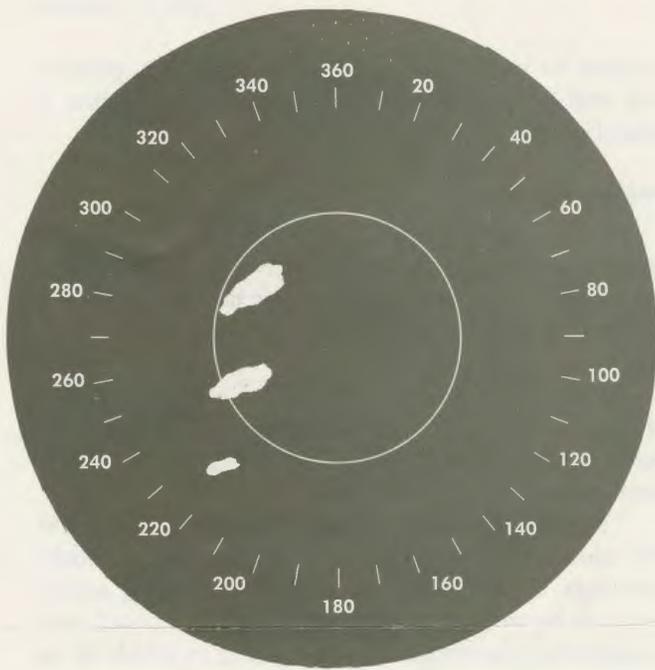


Figure 2. An illustration of a radar display showing the echoes (irregular white areas) from clouds with rain and/or hail. The white ring is a range marker indicating distance from the radar.

also gives personnel information on the direction and speed of cloud motion.

Two airplanes are planned for each district with additional airplanes as financial support becomes available. These airplanes have the capability to fly at altitudes up to 20,000 feet.

Fact Sheets 558, 559, and 560 describe other aspects of weather modification including how clouds grow raindrops and the seeding equipment used.

**Personnel**

Weather forecasts specially designed for the cloud seeding projects are given daily to each project crew by telephone. The crew will consist of one meteorologist, radar operators, and three aircraft pilots.

An experienced meteorologist in each area watches the weather and directs the cloud seeding airplanes to areas in participating counties where suitable clouds are expected to occur or are growing.

Radar operators will assist the meteorologists in watching the weather with radar and in guiding airplanes between suitable clouds.

Figures 3 and 4. Examples of the type of airplanes which are used to seed clouds.



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