WORK ACCOMPLISHED TO DATE
by the
ADVISORY COMMITTEE ON WEATHER CONTROL

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Introduction

Two years ago at the Western Snow Conference in Salt Lake City, Utah a task force of the Advisory Committee on Weather Control gave a report on the aims and activities of the Committee. An outline of the program to evaluate cloud seeding techniques was discussed in some detail.

Today the present paper will attempt to outline the progress which has been made in the various phases of weather modification of particular interest to the Committee: Two phases of this evaluation program are of particular interest to the members of the Western Snow Conference. First, snow pack increase by seeding in mountainous areas during favorable weather conditions. The obvious economic benefits for hydroelectric power and agricultural uses are of greatest importance. The second phase of this evaluation of special interest to you is the suppression of lightning and the reduction in the number of forest fires. This is a subject that Mr. Jack Barrows will tell you more about later.

You will be interested in the results of the First Interim Report which was submitted to President Eisenhower on February 8, 1956. These results will be given later. However, before telling you of these results I think you will be interested in knowing that the Committee is not "chair borne" and although its Headquarters are in Washington, D. C., task forces of the Committee have made, and are making, frequent visits to mountainous areas in the Western states to observe cloud seeding operations in the High Sierras and in other areas in Oregon, Washington, Nevada, Utah, Arizona, Colorado and Nebraska to observe field operations and get first hand reports from the ranchers, farmers, fruit growers, utility executives and other clients of cloud seeding companies. (Members of the Committee have had the pleasure of meeting many of you here today.) Information gained in this manner has been of greatest assistance to the Committee in developing its evaluation program. As recently as February of this year, a task force of the Committee made a trip to the High Sierras, Kings River, Santa Clara Valley in California, Northern Nevada and Medford, Oregon to hold discussions with the various interested persons and to observe at first hand the field operations. Only last week a task force of the Committee visited several counties in Southern Utah to talk to farmers and ranchers in that area.

The Evaluation Program

In July 1954 the Committee received its first funds which permitted it to hire a staff and to start its own evaluation. Little difficulty was experienced in getting the administrative members of the staff, but it was not until January 15, 1955 that the scientific group was recruited and started operating. This group consists of a Chief Scientific Advisor, Captain F. A. Berry, USN, an outstanding Naval officer and meteorologist of international reputation and a Chief Climatologist, Mr. Herbert C. S. Thom, who is both a climatologist and statistician of highest reputation, on loan to the Committee from the Weather Bureau. Some of you know Mr. Thom and will remember that he evaluated the cloud seeding operations conducted for the Bonneville Power Administration several years ago. Supporting Captain Berry and Mr. Thom is a highly competent group of statisticians and meteorologists who are quite familiar with the various aspects of weather modification. To further guide this technical group the Committee has a statistical panel of four eminent statisticians who meet from time to time with Mr. Thom and his group to discuss various phases of the evaluation program.

In approximately one year's time this group has analyzed the results of cloud seeding operations on over 5000 storms. If any of you are familiar with statistics you can well imagine how many million numbers this group has had to use in order to observe the effects of cloud seeding on each of these storms. It has been an effort truly of major magnitude.

Operation Overseed

Soon after the technical group started operating it realized that it would be necessary to have a field observation program in order to support the statistical work. This was brought quite forceably to the attention of the technical group when a Weather Bureau official reported very significant increases in a cloud seeding project which he had evaluated. He planned to present the results at a public conference. Then on rechecking, the official learned, to his great sorrow, that no cloud seeding operations had been carried out during part of the period that he had evaluated.

To forestall the possibility of the Committee's evaluation group being caught in such a trap it was decided to take two courses of action: One, to get monthly reports from all commercial cloud seeding companies throughout the United States giving pertinent data on the time and date of operation of the generators, type of storms, hours of seeding and other necessary information to assist in the evaluation and secondly, to set up a project known as

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OPERATION OVERSEED at Mt. Washington, New Hampshire under the sponsorship of the Mt. Washington Observatory. A small staff of competent field personnel, guided by an expert panel composed of Drs. Schaefer, Vonnegut and Reynolds, are carrying out actual cloud seeding operations principally to determine the nuclei count in the generators on top of the mountain at the Observatory, to determine the effectiveness of the different types of silver iodide generators and to get photographic documentation of the effects of cloud seeding on super-cooled cloud situations when icing is occurring at the Observatory.

It was hoped that with a large battery of generators up-wind that it might be possible to overseed the clouds and actually stop the icing conditions by converting all of the moisture in the clouds into ice crystals. With pulsed operation - the generators on one hour and off one hour - it might be definitely shown that overseeding is possible.

Much valuable information has been gained from OPERATION OVERSEED, principally as to the nuclei count, the decay rate of silver iodide, and the photographic documentation of the effects of seeding. However, the ideal type of weather situation to determine whether it is possible to overseed had not been experienced up to the last reports. We are still hopeful that a favorable situation will occur between now and June 1 when this project ends.

The First Interim Report

In December 1955 the Committee received a report from the technical group indicating that small, but positive increases in precipitation were showing up from projects analyzed in the three Pacific Coast states where cold deep moist storms of the late winter and spring months were producing average increases of 9% to 17% as a result of the cloud seeding operations. Rigid criteria were set up before the evaluation was started and those projects having continuous operations of 3 to 5 years showed the average increase mentioned above. This means that individual storms may have produced significantly greater increases while the operation on other storms may have produced no increase at all.

In terms of economic benefits for the State of California, Senator Case (R. of South Dakota) has reported in the Congressional Record that the precipitation increases of 9% and 17% could produce average annual benefits ranging from $20,000,000 up to $50,000,000 in the states of Washington, Oregon, and California.

Note, and this is important, the evaluation to date applied only to the three Pacific Coast States. Results in other mountainous states are undetermined as yet as well as evaluations over flat land areas of the states in the Mississippi Valley and other areas having no mountains to assist in forcing the silver iodide into the clouds - this is known as the orographic affect in technical meteorological circles.

The Committee has also received interesting evidence that it may be possible to conduct cloud seeding operations of potential lightning producing storms and prevent or reduce the frequency of forest fires caused by lightning strikes. The Committee has recently entered into a cooperative arrangement with PROJECT SKYFIRE to assist in this evaluation. Our good friend Jack Barrows is prepared to give you full details on this program.

By the same analogy and for the same technical reasons, if the frequency of lightning can be reduced, cloud seeding at the proper time should also be able to reduce the frequency of hail. The reasoning is that if a potential hail producing cloud is seeded early enough it will rain itself out before it reaches hail producing proportions. The Committee is encouraging research in this field and hopes to evaluate several projects by private groups this coming spring.

The Committee has recommended an extension of its life for two years, not because its work has not been completed, but because the results appear to be so economically important to the nation that the federal interest should continue for another two years until the Committee can complete its present program. The technical group has recommended a two year evaluation program which they hope will give many of the answers regarding the effectiveness of cloud seeding under the various weather conditions in various locations in the United States. There will, of course, still be many unanswered questions in June 1958, but these questions can be turned over, in an orderly manner, to the Department of Interior, the Department of Agriculture or any other permanent agency having primary responsibility for further research and study. By that time this Committee will have completed an exhaustive evaluation of the possibilities of present cloud seeding techniques.

There are extra copies of the Interim Report at the Committee Headquarters if any members of the Western Snow Conference should desire a personal copy.