TRACKING SILVER IODIDE NUCLEI UNDER OROGRAPHIC INFLUENCE

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During the past twenty years, since Vincent Schaefer and Bernart Vonnegut demonstrated that clouds could be modified by the introduction of artificial freezing nuclei, there have been massive assumptions and impressive voids in our knowledge of plume patterns associated with silver iodide dispensed from aircraft and groundbased sources. These assumptions have probably contributed more to the erratic project results and apparent failures of some field programs than any other single source of difficulty. If a single program is dependent upon the arrival in time and distribution in space of a given material, the need to determine these variables seems elementary and of first order importance.

For the past eleven years there has been an operating cloud seeding program on the Kings River watershed in the southern portion of California's Sierra range. The program includes the use of 30 silver iodide ground generators and supplementary seeding from aircraft using both silver iodide and dry ice. Until 1962, this program made no effort to determine the dimensions of plumes from either ground or aircraft sources. As in other programs, it had been assumed that if the material were dispensed somewhere upwind from a given target area it would eventually arrive at the right place and at the proper time.

In the early winter of 1962 a program was initiated to establish the areal distribution of silver iodide downwind from ground generator sites and certain aircraft seeding flights. While the program was not designed as a tight quantitative investigation, it was felt that it would not be too difficult to establish the general boundaries of the plumes as well as give some feeling about the normal background count of natural freezing nuclei under various meteorological conditions.

The equipment chosen for this work was the Portable Cold Box manufactured some years ago by Meteorology Research, Inc., Altadena, California. Essentially this unit is composed of a one liter chamber immersed in a bath of alcohol. Solid carbon dioxide serves as the coolant for the isopropyl alcohol which is circulated around the cold chamber by pressure from the CO_2. The temperature in the cold chamber is controlled by the rate of alcohol circulation throughout the system. A collimated light source, one centimeter thick, directed into the cold chamber provides illumination. A simple optical system mounted above the cold chamber provides appropriate viewing. The optical system contains a grid network which allows the viewer to examine about 30 cubic centimeters of volume in the