Bob NHRE

NATIONAL CENTER FOR ATMOSPHERIC RESEARCH
BOULDER, COLORADO
80302

Telephone
303-444-5151

Post Office
Box 1470

25 January 1971

Mr. Daniel Hunt, Jr., Head
Office of National Centers
and Facilities Operations
National Science Foundation
Washington, D. C. 20550

Dear Dan:

This is the eighth report on the National Hail Research Experiment.

1. Activities

a. Seeding Rockets. A summary of the Phase I tests of the 2.75" rocket at the U.S. Army White Sands Missile Range (WSMR) is attached (Attachment 1). Further development of the 2.75" rocket is being held in abeyance until results of the tests of the CSU 1.5" rocket conducted at the U.S. Navy Pacific Missile Range are available for review.

b. Controlled Firing Area (CFA). No further negotiations have taken place. The next step in establishing a CFA will be taken when the information referred to in the above paragraph is available.

c. Data Acquisition and Display System (DADS). Procurement of the components has been started. It is expected that all items will be delivered within the next two months. Our plans for next summer have not changed. It is still planned to telemeter and display limited data from three aircraft: the University of Wyoming C-45, the South Dakota School of Mines and Technology T-28, and the NCAR Sabreliner. In addition, we also plan to have available from the Colorado State University Computer Center data from the CSU F-101B and the T-28. This data will be transmitted to the NHRE headquarters via a full duplex, high quality (3600 bps) landline. In addition, we also plan to have the capability to display the track of a selected aircraft and contoured radar from the dual-wavelength radar that will be located at the headquarters site.

d. Workshop on Hail Suppression Concepts. A workshop on hail suppression concepts was held on 14 and 15 January. A copy of the agenda is attached (Attachment 2).

The workshop served the purpose of delineating the areas of agreement and disagreement among the participants concerning hail suppression. There seems to be general agreement that the volume of cloud where the hail embryos grow is a small fraction of the total cloud. Its location in the total cloud and its relationship to the updraft are fairly well agreed upon.

The major disagreement concerns the seeding method necessary to efficiently seed this volume. Cloud-base seeding, direct injection by airborne or ground-based rockets, or by droppable cloud seeding cartridges were thoroughly discussed. No definite conclusions were reached.

The workshop was extremely useful in clarifying several concepts on the cloud physics and the dynamics of hailstorms.

2. University Research Support

We are now in the process of negotiating subcontracts with the University of Wyoming, the South Dakota School of Mines and Technology, and Colorado State University. Through discussion, their research efforts have been designed so that they fit within the design of the NHRE. Their contributions are summarized below:

a. University of Wyoming. The cost of this subcontract is $195,492. The objective of the research program is twofold:

1. Contribute to the investigation of hailstorm dynamics through aircraft observations in the subcloud layer and on certain occasions in the lower regions of the organized updraft, and ground observations by two specially equipped mobile ground teams that can be positioned at selected locations relative to the storm.

2. Contribute to the clarification of the microphysical processes involved in hail formation through ice nuclei measurements in the updraft, through observing the development of possible hail embryos in developing cumulus and through the analysis of precipitation samples.

b. South Dakota School of Mines and Technology. The cost of this subcontract is $94,972. The objectives of the research program are, through aircraft measurements to determine the composition of the high reflectivity zones in the updraft regions of selected severe convective storms, and to use these and other selected data in refining numerical hailstorm models.

c. Colorado State University. It is estimated that this subcontract will cost in the vicinity of $175,000. The objectives of the CSU research program are to determine, through airborne and surface measurements, the dynamical-thermodynamical properties of hailstorms, to complete the instrumentation and telemetry systems associated with the T-28 and F-101B aircraft, and to assist in the NHRE hailstorm modification program.

In addition, negotiations will commence concerning the operation and associated research as related to the dual-wavelength radar now under development by the University of Chicago and the Illinois State Water Survey.

3. NCAR Research Support

In addition to Dr. Robert Bushnell, whose research group has been a part of the NHRE since its formation, other LAS scientists who are participating in NHRE include: Dr. Jan Rosinski, Nucleation Studies; Dr. Charles Knight, Hailstone Analysis; and Dr. Allan Lazrus, Silver Iodide Analysis. Other participants are expected.

4. Liquid Water Meter

This development program is summarized in Attachment 3.

5. Advisory Panel

The first meeting of the NHRE Advisory Panel was held 4 December 1970. Panel members present were: Drs. Roscoe Braham, Walter Hitschfeld and Patrick Squires. A copy of the minutes is enclosed as Attachment 4. It is planned that the next meeting will be held in March.

6. Meeting of Government Representatives

It is planned that a meeting of interested government agencies will be held in early February. The purpose of the meeting will be to firm up their participation and their contributions to the NHRE.

7. Personnel

Since the last report, three additional persons have been added to the NHRE staff. These are:

a. Mr. Ackley C. Smith, an engineer who will assist in the design and assembly of the Data Acquisition and Display System (DADS) and the Liquid Water Meter designed by Dr. Thomas G. Kyle.

b. Mr. Charles L. Reynolds, an electronics technician who will assemble the DADS.

c. Mr. Melvin O. Baker, who fills the vacancy for a logistics planning assistant.

This increases the NHRE staff to twelve (12). Likely additions in the next few months are a dynamical meteorologist, a data specialist, a forecaster, and an atmospheric electrical specialist.

8. Equipment Procurement

Since the previous report the procurement of the following equipment has been initiated:

a. Bids on the DADS computer and associated peripheral have been requested. These will be in by 18 January 1971. We anticipate delivery by not later than mid-March 1971.

b. Communications Equipment. Action has been started to procure the additional radar transceivers required for the NHRE voice and data telemetry circuits.

c. A subcontract has been negotiated with Colspan, Boulder, Colorado, for the repair of 58 dropsondes at a total cost of $40,380.

d. Bids have been requested for the construction of eight(8) mobile field units for use as operating space, laboratories, and workshops. Bids are expected by 8 February 1971, and delivery is expected by mid-April 1971.

8. Budget

We have now reprogrammed our NHRE budget to conform to the $1.5 million FY 1971 funding proposed by Dr. White. The possible effect of this on the FY 1972 and FY 1973 budgets was discussed in my letter dated 16 December 1970. We are now in the process of preparing the estimates for FY 1972 and FY 1973. They will be ready for submission in the near future.

Sincerely yours,

John W. Firor
Director

Attachments: 4

cc: Glenn Stout (4)
W. C. Swinbank (6)